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Revision of *Pylopagurus* and *Tomopagurus* (Crustacea: Decapoda: Paguridae), with descriptions of new genera and species. Part VI. *Pylopagurus* A. Milne-Edwards & Bouvier, 1891, *Haigia* McLaughlin, 1981, and *Pylopaguridium*, a new genus

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Abstract.—In this final part of a six-part series, two new species of *Pylopagurus* A. Milne-Edwards & Bouvier are described, *P. macgeorgei* and *P. gorei,* and one existing species, *P. longicarpus* Walton, is placed in synonymy with *P. holmesi* Schmitt. Some species of *Pylopagurus* have been found to exhibit weak development of a male sexual tube, thus requiring emendation of the generic diagnosis. A new monotypic genus, *Pylopaguridium,* is proposed for a new species, *P. markhami,* in which males have asymmetrical coxae of the fifth pereopods. The monotypic Pacific genus *Haigia* McLaughlin, is reviewed. An amended key to all the genera of the "*Pylopagurus-Tomopagurus*" group, and a key to the species now assigned to *Pylopagurus* are included. All species of *Pylopagurus, Pylopaguridium,* and *Haigia* are diagnosed or described and illustrated, and their morphological variations discussed.

As pointed out by McLaughlin (1981a), the principal characters uniting the genera *Pylopagurus* A. Milne-Edwards & Bouvier, 1891 and *Tomopagurus* A. Milne-Edwards & Bouvier, 1893, presumably were the presence of 11 pairs of biserial gills (cf. McLaughlin & de Saint Laurent 1998), the occurrence of paired first female pleopods modified as gonopods, and the absence of secondary sexual modifications in males. In her initial revision of the "*Pylopagurus-Tomopagurus*" group, McLaughlin (1981a) subdivided *Pylopagurus* sensu lato into 11 genera, and redefined *Tomopagurus* to include species in which female gonopods might not develop. Subsequently, Lemaitre & McLaughlin (1996) described and added another genus, *Protoniopagurus* Lemaitre & McLaughlin, 1996, to the group. In this concluding study of *Pylopagurus* sensu stricto, we have found it necessary to adjust our concept of the genus again as the result of the observations of slight sexual tube development in some species and in related "*Pylopagurus-Tomopagurus*" group genera. It would appear that these genera bridge phylogenetic gaps between those genera with highly specialized male secondary sexual adaptations, other genera in which females develop modified paired first pleopods, and those more simplistic genera such as the heterogeneous genus *Pagurus* Fabricius, 1775.

Specimens included in part VI have come from the Allan Hancock Foundation, University of Southern California, now part of the collections of the Natural History Museum of Los Angeles County (LACM CR); Dauphin Island Sea Lab, University of Alabama (DISL); Florida Department of Natural Resources, St. Petersburg (DNR); Florida International University, Miami (FIU); Instituto de Ciencias Naturales, Museo de Historia Natural, Universidad Na-

cional de Colombia, Bogotá (ICN-MHN-CR); Instituto de Investigaciones Marinas y Costeras de Punta de Betín, Santa Marta (INVEMAR-CRU); Museum of Comparative Zoology, Harvard University, Cambridge (MCZ); Muséum national d'Histoire naturelle, Paris (MNHN); Nationaal Natuurhistorisch Museum (formerly Rijksmuseum van Natuurlijke Historie), Leiden (RMNH); National Marine Fisheries Service (NMFS); National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM); Rosenstiel School of Marine and Atmospheric Science, University of Miami (UMML, RSMAS); Swedish Museum of Natural History, Stockholm (SMNH); Texas A & M University (TAM); The Natural History Museum [formerly British Museum (Natural History)], London (NHM); and the senior author's personal collection (PMcL). Specimens have been returned to and/or deposited in these institutions.

In the "Material examined" sections, the specimens are listed from north to south. The station abbreviation D, refers to SCUBA dive stations, NR, to stations of the Bellairs Research Institute, Barbados. The following abbreviations used refer to vessels utilized by various institutions or expeditions: A, United States Fish Commission Steamer *Albatross;* AN, B/I *Ancón* (INVEMAR); BA, U.S. Coast and Geodetic Survey Steamer *Bache*; B, M/V *Bellows* (FIU); BK, U.S. Coast Survey Steamer *Blake*; DE, R/V *Delaware,* U.S. National Oceanic and Atmospheric Administartion; DO, R/V *Dolphin,* South Carolina Wildlife and Marine Resources Center; E, M/V *Explorer* (NMFS); EW, R/V *Eastward,* (VIMS); FH, United States Fish Commission Steamer *Fish Hawk;* G, R/V Ger*da* (RSMAS); JSL, research submersible *Johnson Sea Link I* (Harbor Branch Oceanographic Foundation, Fort Pierce, Florida); JSDSE, Johnson-Smithsonian Deep Sea Expedition; M, R/V *Megalopa;* O, M/V *Oregon* (NMFS); P, R/V *John Elliott Pillsbury* (RSMAS); PE, R/V *Pelican* (U.S. Fish and Wildlife Service); SB, M/V *Silver Bay* (RSMAS); SUIBE, State University of Iowa Bahamas Expedition; T, M/V *Tursiops* (NMFS). A single measurement, shield length (sl), measured in millimeters (mm) from the tip of the rostrum to the midpoint of the posterior margin of the shield provides an indication of animal size. Other abbreviations used are: juv, juvenile(s); ovig, ovigerous; sta, station.

Pylopagurus A. Milne-Edwards & Bouvier, 1891

Pylopagurus A. Milne-Edwards & Bouvier, 1891:103; 1893:74 (in part).—Faxon, 1895:61 (in part).—Alcock, 1905:189 (in part).—Schmitt, 1921:143 (in part).—Barnard, 1950:453.—Walton, 1954:140 (in part).—Forest & de Saint Laurent, 1968:145 (in part).—Scanland & Hopkins, 1969:257.—Miyake, 1978:119 (in part); 1982:227 (in part); 1991:227 (in part).—McLaughlin, 1981a:2 (in part).

Type species.—*Eupagurus discoidalis* A. Milne-Edwards, 1880, by designation by Miyake (1978). Gender: masculine.

Amended diagnosis.—Eleven pairs of biserial gills. Lateral projections widely separated from acute rostrum. Ocular acicles triangular, often acutely so, with small to moderately strong submarginal spine; usually separated basally by more than basal width of 1 acicle. Maxillule (Fig. 1a) with external lobe of endopod obsolete to moderately well developed, never recurved, internal lobe with 1 terminal bristle. Maxilla (Fig. 1b) with proximal lobe of scaphognathite moderately narrow to moderately broad. First maxilliped (Fig. 1c) with slender exopod. Third maxilliped with well developed crista dentata and prominent accessory tooth; merus frequently with spine at dorsodistal margin, carpus unarmed. Sternite of third maxillipeds unarmed or with 1 or 2 small spines on either side of midline.

Right cheliped markedly larger than left; chela subcircular to subrectangular, oper-

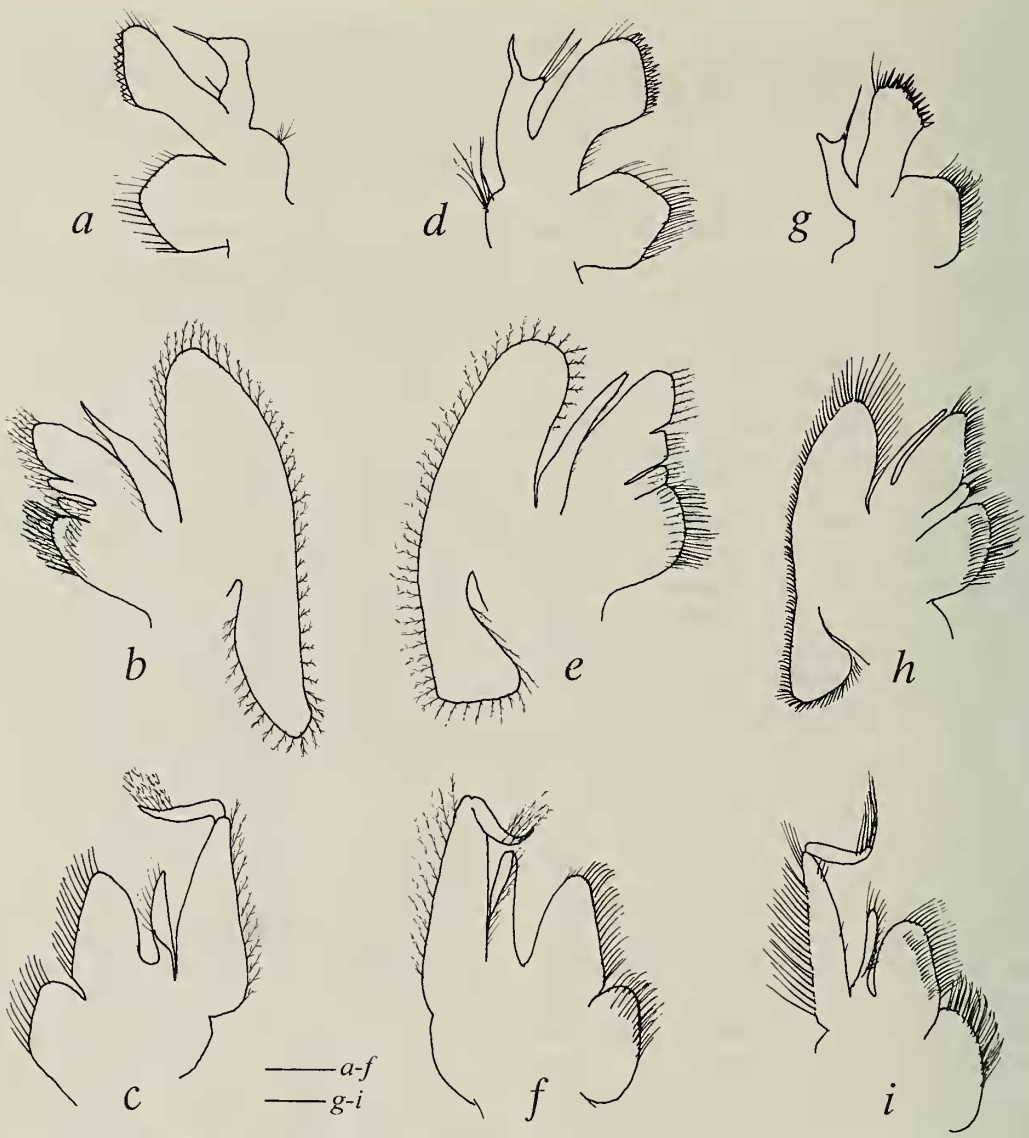

Fig. 1. Mouthparts, internal view. a–c, *Pylopagurus discoidalis* (A. Milne-Edwards, 1880), right, ♀ (sl = 4.2 mm), sta P-890, off Lesser Antilles, UMML 32:4756; d–f, *Haigia diegensis* (Scanland & Hopkins, 1969), left, ovig ♀ (sl = 5.2 mm), Los Angeles Harbor, PMcL; g–i, *Pylopaguridium markhami,* new species, left, paratype ♂ (sl = 2.0 mm), sta D68, Turks and Caicos Islands, USNM 306896. a, d, g, maxillule; b, e, h, maxilla; c, f, i, first maxilliped. Scales equal 0.5 mm (a–f), and 0.2 mm (g–i).

culate; angle of articulation of chela and carpus generally perpendicular. Left cheliped with chela small; dactyl and fixed finger dorsoventrally compressed; palm flattened, slightly concave or slightly convex; angle of articulation of chela and carpus perpendicular or only slightly twisted. Ambulatory legs with or without dorsodistal carpal spine. Fourth pereopods with well developed dactyls, elongate claw and usually small to very prominent preungual process; propodal rasp consisting of single row of corneous scales.

Sternite of third pereopods with narrow, subovate, subquadrate, or subsemicircular anterior lobe. Sternites of pereopods 4 and

5, and less frequently also third, often with capsulate setae. Males with coxae of fifth pereopods symmetrical; usually without, but occasionally with, vas deferens protruded from one or both coxal gonopores to form very short to moderately short sexual tube(s); 3 unpaired unequally biramous left pleopods (3–5). Females with paired gonopores on coxae of third pereopods; paired first pleopods (Figs. 2g, 4g) incompletely 2-segmented and modified as gonopods, and 4 unpaired biramous left pleopods, second through fourth with both rami well developed, fifth with endopod reduced or rudimentary.

Abdomen straight or rarely flexed. Uropods symmetrical or nearly so. Telson with lateral indentations suggesting division into anterior and posterior portions; posterior lobes symmetrical or only slightly asymmetrical, terminal margins concave or oblique, armed with 2 to several small to moderately large spines; posterolateral margins usually with distinct corneous or calcareous plate.

Distribution.—Western Atlantic from southeastern United States (North Carolina) to central Brazil; Caribbean and Gulf of Mexico; eastern Pacific from southern California to Baja California and the northern Gulf of California, Mexico.

Remarks.—McLaughlin (1981a) subdivided the genus *Pylopagurus* sensu lato into several genera primarily distinguished from other genera of the family by gill number and structure, and the presence of paired female gonopods. In other genera included in this "*Pylopagurus-Tomopagurus*" group, the development of any form of secondary male sexual characters had not been recognized. Thus, we were understandably surprised to notice that in one new species of the genus, males had clearly developed, albeit short, right sexual tubes. While at first we were tempted to consider this protrusion of the vas deferens as merely an artifact of preservation, the observed sexual tube was as well developed as that reported for some species of *Parapagurodes* McLaughlin & Haig, 1973 (cf. McLaughlin & Jensen 1996). The potential for development of a male sexual tube in the "*Pylopagurus-Tomopagurus*" group was unquestionably established when males of additional species of *Pylopagurus* were also found to exhibit such development. Close reexamination of the other genera and species will be necessary to determine the extent to which sexual tube development has progressed in the group.

McLaughlin (1981a) restricted *Pylopagurus* to species typified by *P. discoidalis* (A. Milne-Edwards, 1880), and additionally assigned *P. holmesi* (Schmitt, 1921), *P. longicarpus* Walton, 1954, *P. stewarti* (Filhol, 1883), and *P. serpulophilus* Miyake, 1978, to this genus. During the course of this extended study, McLaughlin & Gunn (1992) determined that both *P. stewarti* and *P. serpulophilus* correctly should have been assigned to *Australeremus* McLaughlin, 1981a. McLaughlin & Gunn (1992) also synonymized Miyake's (1978) taxon with *A. triserratus* (Ortmann, 1892). More recently, *Australeremus* has been reduced to subgeneric rank within the genus *Lophopagurus* McLaughlin, 1981a (de Saint Laurent & McLaughlin 2000). In the present study we have concluded that *P. longicarpus* is synonymous with *P. holmesi.*

Pylopagurus pattiae Lemaitre & Campos, 1993
Figs. 2, 3

Pylopagurus pattiae Lemaitre & Campos, 1993:554, figs. 1, 2 (type locality: Bahía de Chengue, Colombia).

Holotype.—♂ (sl = 2.0 mm), Bahía de Chengue, Parque Nacional Natural Tayrona, north of Santa Marta, Colombia, 20–40 m, 3 Dec 1988, coll. N. H. Campos, USNM 259412.

Paratypes.—Parque Nacional Natural Tayrona, north of Santa Marta, Colombia: 2 ♂ (sl = 1.7, 1.8 mm), Bahía de Chengue, 20–40 m, 3 Dec 1988, coll. N. H. Campos, USNM 251896.—2 ♂ (sl = 1.4, 1.7 mm),

2 ovig ♀ (sl = 1.7, 1.8 mm), Bahía de Cinto, 20–40 m, 30 Nov 1989, coll. N. H. Campos, USNM 251897.—16 ♂ (sl = 1.1–2.1 mm), 4 ♀ (sl = 1.5–1.9 mm), 10 ovig ♀ (sl = 1.6–1.9 mm), Bahía de Concha, 20–40 m, 3 Dec 1988, coll. N. H. Campos, INVEMAR-CRU-1202, ICN-MHN-CR.

Other material examined.—Caribbean Sea: 1 ♀ (sl = 1.8 mm), Chub Cay, Bahamas, sta JSL-1-3660, 25°23.08′N, 77°51.129′W, 77 m, 15 Feb 1994, colls. P. Santos, G. Goodfriend, J. Elliott, J. Harasewych, USNM 309719.—2 ♂ (sl = 1.4, 1.6 mm), sta P-775, 12°0.5′N, 72°38.50′W, 78–82 m, 29 Jul 1968, USNM 309717.—37 ♂ (sl = 1.5–3.6 mm), 6 ♀ (sl = 2.4–2.6 mm), 4 ovig ♀ (sl = 2.1–2.6 mm), 1 intersex (sl = 1.9 mm), some with rhizocephalan, sta P-718, 11°22.50′N, 64°08.60′W, 60 m, 20 Jul 1968, RMNH D48671, SNHM 31601-31605, USNM 309713.—1 ♂ (sl = 2.7 mm), (in poor condition), sta P-842, 11°10.60′N, 60°31.20′W, 68–73 m, 1 Jul 1969, USNM 309718.—10 ♂ (sl = 2.5–2.9 mm), 1 ♀ (sl = 2.6 mm), 5 ovig ♀ (sl = 1.8–2.5 mm), 1 juv sex indet. (sl = 1.1 mm), sta P-721, 11°06.50′N, 64°22.50′W, 25–27 m, 21 Jul 1968, USNM 309714.—1 ♂ (sl = 2.1 mm), sta P-727, 10°20′N, 65°02′W, 64 m, 21 Jul 1968, USNM 309715.—1 ♀ (sl = 2.3 mm), sta P-734, 11°01.80′N, 65°34.20′W, 60–67 m, 22 Jul 1968, USNM 309716.—1 ♂ (sl = 2.3 mm), Shelf Expedition sta 1, Luymes, Guyana, RMNH D48672.

Diagnosis.—Shield (Fig. 2a) distinctly longer than broad; rostrum triangular, blunt or acute, and frequently with tiny spinule; lateral projections broadly triangular, terminally rounded. Ocular peduncles moderately short and stout, corneas weakly dilated; ocular acicles triangular, with small submarginal spine; separated basally by slightly more than basal width of 1 acicle. Antennular and antennal peduncles both at most slightly overreaching distal margins of corneas. Antennal acicles short, usually not reaching to bases of corneas, rarely very slightly beyond.

Right cheliped (Figs. 2b, 3b, c) varying from moderately short and broad to appreciably elongate. Dactyl approximately as broad as fixed finger and 0.65–0.75 times length of palm, dorsal surface flattened, unarmed, dorsomesial margin raised as crenulate ridge. Palm and fixed finger circumscribed by raised crenulate ridge, dorsal surface flattened or weakly convex, unarmed; dorsoproximal surface, mesial, lateral and ventral surfaces with scattered small tubercles or granules, weakest or absent ventrally. Carpus subtriangular, moderately long; dorsodistal margin often with small spine mesially, dorsal margin often with row of small tubercles or protuberances, surfaces frequently covered with minute granules. Merus with small spine at ventrolateral distal angle, ventromesial margin serrate.

Left cheliped (Figs. 2c, 3a) with propodal-carpal articulation perpendicular to slightly twisted. Dactyl and fixed finger with few tufts of setae on dorsal and ventral surfaces distally; palm circumscribed by low, finely denticulate ridge, dorsal surface and dorsomesial margin each with several to numerous minute tubercles or granules. Carpus subtriangular or subtrapezoidal; dorsodistal margin with 4 spines, dorsal margin with row of setae. Merus with several spiniform bristles on dorsodistal margin.

Ambulatory legs (Fig. 2e, d) not markedly compressed laterally; similar from left to right. Dactyls slightly shorter to slightly longer than propodi, with long, slender corneous claws; dorsal margins each with row of long setae and bristles; ventral margins each with 5–8 corneous spines. Propodi approximately 1.20–1.40 times length of carpi; each with row of setae on dorsal margin occasionally arising from low protuberances and giving impression of minute serrations; ventral margins with row of corneous spines and corneous bristles at distal angle. Carpi each with small dorsodistal spine and dorsal row of setae and few bristles, sometimes also arising from very small protu-

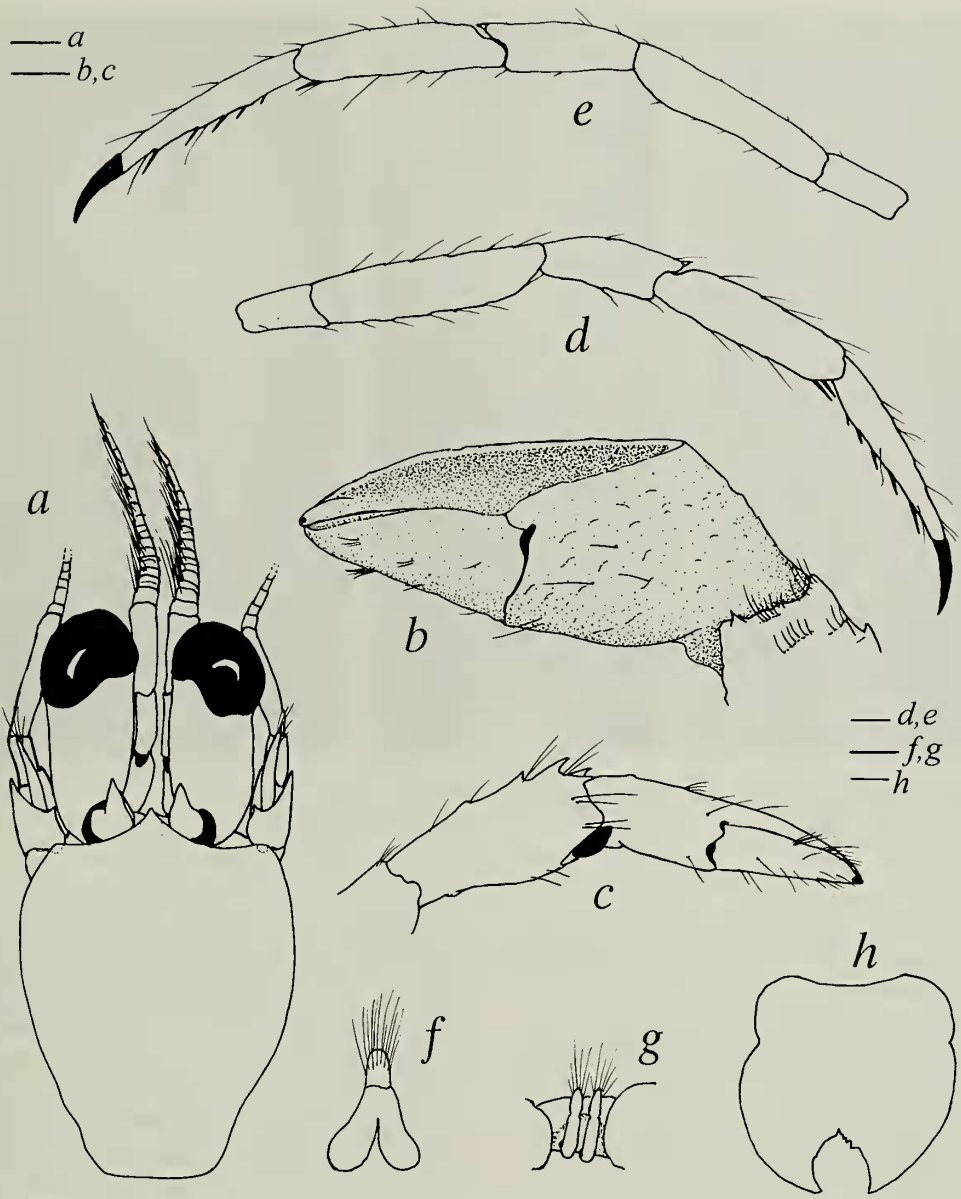

Fig. 2. *Pylopagurus pattiae* Lemaitre & Campos, 1993. a, c–h, paratype ovig ♀ (sl = 1.8 mm), Colombia, USNM 251897; b, ♀ (sl = 1.8 mm), Bahamas, USNM 309719. a, shield and cephalic appendages, dorsal; b, right chela, mesiodorsal; c, left carpus and chela, mesial; d, second right pereopod, lateral; e, third left pereopod, mesial; f, anterior and posterior lobes of sternite of third pereopods, ventral; g, part of coxae and sternite of fifth pereopods, and first pleopods, ventral; h, telson, dorsal. Scales equal 0.25 mm (a–e) and 0.1 mm (f–h).

berances, and giving a minutely serrate appearance. Meri with setae and few bristles on dorsal and ventral margins.

Sternite of third pereopods (Fig. 2f) with setose, subovate anterior lobe. Sternites of fourth and fifth pereopods each with 2 or more capsulate setae. Males without vas deferens protruded from gonopores to form short sexual tubes.

Telson (Fig. 2h) with posterior lobes separated by shallow median cleft, terminal margins oblique, each armed with 1–3 un-

Fig. 3. Chelae of *Pylopagurus pattiae* Lemaitre & Campos, 1993, dorsal. a, b, ♂ (sl = 2.8 mm), sta P-718, Caribbean Sea, USNM 309713; c, ♂ (sl = 2.1 mm), same sta, SNHM 31601-31605. a, left, (27.5×); b, right (11.9×); c, right (37.5×).

equal sharp or blunt spines; lateral margins evenly rounded, each ending posteriorly in strong spine.

Color.—General coloration orange. Ocular peduncles with light orange band near mid-length. Chelae with cutting edges of fingers orange; dorsal surface of right chela with three longitudinally ovate white spots with orange outlines, one medially on palm, one medially at base of fixed finger, and one basally on dactyl and extending slightly onto palm (after Lemaitre & Campos 1993).

Habitat.—All known specimens have been found living in semi-transparent tubes built by polychaetes of the family Onyphidae (*Hyalinoecia* sp.), except a specimen from the Bahamas which was found in a scaphopod *Dentalium* shell.

Distribution.—Caribbean Sea: Bahamas; Colombia; Guiana; and northern coast of Venezuela; 20–82 m.

Remarks.—Individuals of *Pylopagurus pattiae,* like those of the other two new species of this genus described herein, grow only to a relatively small size, with females ovigerous reaching shield lengths between 1.6 and 2.1 mm. The largest specimen seen in our material was a male with a shield length of 3.6 mm. Lemaitre & Campos (1993) considered *P. pattiae* very similar to *P. discoidalis,* a common western Atlantic and Caribbean species that reaches considerably larger size. Although the two species are usually readily distinguished by the armature of the propodi and carpi of the ambulatory legs, small specimens of *P. discoidalis* (sl ≤ 2.0 mm) occasionally do not exhibit the characteristic armature of the dorsal surfaces of these segments. For these small specimens a more reliable differentiating character is the length of the antennal acicles in relation to the corneas. In *P. pat-*

tiae, the acicles are quite short, usually not reaching as far as the bases of the corneas (Fig. 2a); only rarely have we observed specimens in which the acicles have reached beyond the bases of the corneas, and then only slightly. In contrast, the acicles in *P. discoidalis* reach at least mid-length of the corneas, and usually beyond (Fig. 4a).

Pylopagurus pattiae has so far been found outside the Caribbean coast of South America only once, in the Bahamas, whereas *P. discoidalis* is broadly distributed from the southeastern coast of the United States to the northeastern coast of South America. *Pylopagurus discoidalis* most commonly occupies shells of *Dentalium* spp., with or without associated anemones, whereas *P. pattiae* has been found almost exclusively living in corneous, semi-transparent tubes built by polychaetes of the family Onyphidae. Males of *P. pattiae* often exhibit marked variation in the length of the right cheliped that does not appear to be consistently size-related. Similarly to *P. discoidalis,* the dorsal surface of the right chela in *P. pattiae* can be strongly influenced by the type of habitat utilized. The dorsal surface of the chela of the only specimen of *P. pattiae* found in a *Dentalium* shell is much more concave (Fig. 2b) than that in specimens found in polychaete tubes (Fig. 3b, c).

This species has occasionally been found infested with one or two unidentified rhizocephalan parasites. Of three individuals from sta P-718 (USNM 309713) obviously infected, one was a male (sl = 3.5 mm) with well developed paired female gonopods, but a second male (sl = 2.6 mm) similarly infected, but perhaps with a second rhizocephalan species, showed no "feminizing" effect. A parasitized female (sl = 2.6 mm) had only one unusually elongate gonopod present. A fourth specimen (sl = 1.9 mm), from this same station had female-like pleopods, but only three in number. Neither male nor female gonopores were delineated; however, one very elongate female gonopod was developed. In this specimen, there was no external indication of a parasitic infection.

Pylopagurus discoidalis (A. Milne-Edwards, 1880)
Figs. 4–6

Eupagurus discoidalis A. Milne-Edwards, 1880:41 (type locality: BK station 157, off Montserratt).—Miyake, 1978:119.

Pylopagurus discoidalis: A. Milne-Edwards & Bouvier, 1891:104; 1893:76, pl. 6, figs. 7–14.—Alcock, 1905:189.—Schmitt, 1921:145.—Barnard, 1947:377.—Provenzano, 1963:239.—Williams, 1965:134, fig. 109; 1984:226, fig. 162.—Abele & Kim, 1986:388, fig. 389d, e.—McLaughlin, 1981a:2.—Lemaitre & Campos, 1993:557.

Pylopagurus u.: Stebbing, 1910:359.

Holotype.—♂ (sl = 5.5 mm), sta BK-157, off Montserratt, 219 m, 1879, MCZ 4078.

Other material examined.—Eastern coast of United States: 1 ♂ (sl = 3.3 mm), sta EW-E-1-73, off Carolinas, (no depth), 1973, USNM 309702.—(In poor condition), sta DE-7, 36°08′N, 74°49′W, 113 m, 16 May 1970, USNM 108169.—3 ♂ (sl = 2.0–3.5 mm), 1 ♀ (sl = 2.8 mm), 2 ovig ♀ (sl = 2.5, 2.6 mm), SE Cape Hatteras, North Carolina, sta A-2600, 34°39.50′N, 75°35.50′W, 291 m, 18 Oct 1885, USNM 11287.—1 ♂ (sl = 3.3 mm), sta EW-14590, North Carolina, 33°59′N, 76°15.60′W, (no depth), 29 Jul 1970, USNM 309674.—1 ♂ (sl = 5.0 mm), 1 ovig ♀ (sl = 5.2 mm), sta SB 2539, 33°03.50′N, 77°33.50′W, 183 m, 5 Dec 1960, USNM 309730.—off South Carolina, sta PE-183-3, (no depth), 14 Feb 1940, USNM 102810.—5 ♂ (sl = 1.0–2.5 mm), 1 ♀ (sl = 1.3 mm), east of Sapelo Island, Georgia, sta 298, 31°26.32′N, 79°42.13′W, 252–291 m, 6 Aug 1963, USNM 150222, 150223.—1 ♀ (sl = 3.2 mm), sta DO-573390, 30°50′N, 79°53′W, 278 m, 3 Nov 1973, coll. E. L. Wenner, USNM 188198.—1 ♀ (sl = 2.8 mm), haul

45, off Miami Beach, 139 m, 25 Aug 1951, coll. F. M. Bayer, UMML 32:4853.—1 ovig ♀ (sl = 2.7 mm), 1.4 mi (2.6 km) off sea buoy Miami, 73 m, 24 Jan 1951, colls. G. Voss, F. M. Bayer, UMML 32:2473.—1 ♂ (sl = 3.8 mm), off Miami Beach, Florida, Marine Lab sta 46, 128 m, 25 Aug 1951, coll. F. M. Bayer, USNM 102755.—2 ♂ (sl = 2.0, 3.5 mm), 1 ovig ♀ (sl = 3.0 mm), off surfside Miami Beach, Florida, Marine Lab sta 48, 132 m, 25 Aug 1951, coll. F. M. Bayer, USNM 102754.—1 ovig ♀ (sl = 2.8 mm), off Miami, Florida, 137 m, Nov 1915, coll. J. B. Henderson, USNM 102582.—1 ♂ (sl = 3.2 mm), Miami, Florida, 55 m, coll. J. B. Henderson, USNM 102583.

Gulf of Mexico: 2 ♂ (sl = 2.9, 3.2 mm), 2 ♀ (sl = 1.7, 2.1 mm), DISL sta 22-55-VI-B-a-10, 29°32.75′N, 87°23.50′W, 91 m, 1975, USNM 309734.—1 ♀ (sl = 5.7 mm), DISL sta 22-55-VI-C-c-8, 29°32.50′N, 87°21′W, 183 m, 1975, USNM 309735.—4 ♂ (sl = 3.8–5.0 mm), 2 ♀ (sl = 3.3, 3.9 mm), 1 ovig ♀ (sl = 3.2 mm), DISL sta 13-55-V-C-c-5, 29°30.25′N, 86°25.5′W, 183 m, 20 Jul 1975, USNM 309736.—1 ♀ (sl = 3.6 mm), sta O-1447, 29°20′N, 87°30′W, 439 m, 17 Feb 1956, USNM 309691.—1 ovig ♀ (sl = 4.1 mm), sta A-2401, 28°38.5′N, 85°52.50′W, 260 m, 14 Mar 1885, USNM 9756.—1 ♂ (sl = 3.5 mm), 1 ovig ♀ (sl = 4.7 mm), sta A-2402, 28°36′N, 85°33.50′W, 203 m, 14 Mar 1885, USNM 9765.—2 ♂ (sl = 4.1, 4.6 mm), 2 ♀ (sl = 4.0–4.7 mm), 2 ovig ♀ (sl = 3.4, 4.4 mm), DISL sta 13-55-III-C-c-14, 28°22.75′N, 85°14.50′W, 1975, USNM 309737.—1 ♂ (sl = 6.5 mm), sta O-4658, 27°46′N, 93°37′W, 183 m, 30 Jan 1964, NHM 2001.368.—1 ♀ (sl = 2.4 mm), sta A-5119, 26°39′N, 83°56.50′W, 82 m, 23 Mar 1889, USNM 42556.—1 ♀ (sl = 2.6 mm), BK sta 50, 26°31′N, 85°03′W, 218 m, 1877–78, coll. A. Agassiz, MCZ 2583.—1 ♂ (sl = 1.7 mm), (in poor condition), BK (no sta number), 26°31′N, 89°03′W, 218 m, (no date), coll. A. Agassiz, MCZ 4081.—1 ovig ♀ (sl = 3.0 mm), DISL sta 22-55-II-8a-4, 26°27′N, 84°10.75′W, 183 m, 1975, USNM 309738.—1 ovig ♀ (sl = 2.4 mm), 22-51-I-B-9-3, 26°25′N, 83°50′W, USNM 309739.—1 ♂ (sl = 3.4 mm), 2 ovig ♀ (sl = 2.7, 3.0 mm), BA, off Sand Key, Florida, 137 m, 29 Mar 1872, coll. W. Stimpson, MCZ 3024, 3060, 4082.—2 ♂ (sl = 4.0, 5.0 mm), 1 ♀ (sl = 3.7 mm), sta BK-36, 23°13′N, 89°16′W, 154 m, 1877–1878; sta BK-291, 13°12′N, 59°41′W, 384 m, 9 Mar 1879, MCZ 4079 (specimens mixed in same lot).—1 ♂ (sl = 2.5 mm), 1 ♀ (sl = 2.4 mm), BA, west Florida, 21°14′N, (no longitude), 183 m, 22 Apr 1872, coll. W. Stimpson, MCZ 3023.—2 ovig ♀ (sl = 5.2, 6.1 mm), sta O-3637, 17°13′N, 87°55′W, 219–311 m, 10 Jun 1962, USNM 309692.—2 ♂ (sl = 4.8, 6.1 mm), sta 70A10-26, 15°17.80′N, 81°21.90′W, 247–256 m, 13 Jul 1970, coll. W. Pequegnat, TAM.—1 ♀ (sl = 5.7 mm), west coast of Florida, Manatee County, 61–370 m, DNR.

Straits of Florida, and Florida Keys: 1 ♀ (sl = 3.9 mm), sta P-736, 26°44′N, 79°02′W, 19 m, 1 Sep 1965, UMML 32:4761.—1 ovig ♀ (sl = 3.0 mm), sta G-413, 26°20′N, 80°00′W, 183 m, 22 Sep 1964, USNM 309681.—1 ♀ (sl = 3.5 mm), 2 molts, sta G-925, 25°58′N, 78°29′W, 240–250 m, 29 Sep 1967, UMML 32:4744.—4 ♂ (sl = 1.8–2.2 mm), 1 ♀ (sl = 1.8 mm), sta P-810, 26°04′N, 79°58′W, 810 m, 11 Oct 1968, USNM 309689.—1 ♀ (sl = 3.4 mm), + larvae, sta G-7, 25°46′N, 80°03.50′W, 137 m, 25 May 1962, UMML 32:4745.—7 ♂ (sl = 3.2–4.5 mm), 1 ♀ (sl = 3.2 mm), sta G-29, 25°41′, 80°02′W, 183–247 m, 21 Jun 1962, USNM 309678.—12 ♂ (sl = 3.4–5.0 mm), 1 ♀ (sl = 3.7 mm), 1 ovig ♀ (sl = 3.8 mm), sta G-610, 25°25′N, 80°07′W, 77–82 m, 15 Apr 1965, USNM 309705.—2 ♂ (sl = 3.5, 3.8 mm), 1 with rhizocephalan, sta G-606, 25°18′N, 80°04′W, 183 m, 15 Apr 1965, USNM 309683.—1 ♀ (sl = 2.5 mm), + molt, sta G-767, 25°13′N, 80°10′W, 108–88 m, 26 Jan 1966, UMML 32:4743.—5 ♂ (sl = 3.2–5.3 mm), 3 ♀ (sl = 3.1–4.8 mm), 2 ovig ♀ (sl = 3.3, 3.6 mm), sta G-1301,

24°57′N, 80°14′W, 274 m, 27 Mar 1971, USNM 309677.—2 ovig ♀ (sl = 3.5, 3.6 mm), sta SB-2362, 24°56′N, 80°22′W, 84 m, 25 Oct 1960, USNM 309697.—1 ♀ (sl = 4.2 mm), sta G-794, 24°54′N, 80°15′W, 212–219 m, 19 Aug 1966, USNM 309684.—1 ♀ (sl = 3.0 mm), sta M-Dredge 17, 6 mi (11.1 km) SE of Molasses Reef Light, 223 m, 9 Jul 1950, USNM 173734.—3 ♂ (sl = 3.7–4.6 mm), 3 ♀ (sl = 2.0–2.6 mm), sta G-796, 24°48.50′N, 80°20′W, 201–205 m, 19 Aug 1966, USNM 309671.—1 ♀ (sl = 2.4 mm), sta P-598, 24°47′N, 80°26′W, 183, 15 Mar 1967, UMML 32:4760.—5 ♂ (sl = 4.0–5.1 mm), 4 ♀ (sl = 3.5–4.3 mm), 5 ovig ♀ (sl = 3.6–4.4 mm), sta G-757, 24°46′N, 80°28′W, 181–183 m, 15 Sep 1965, USNM 309680.—1 ♂ (sl = 4.3 mm), sta G-589, 24°40′N, 80°48′W, 150 m, 14 Apr 1965, USNM 309682.—1 ♂ (sl = 2.4 mm), sta G-457, 24°37′N, 80°47′W, 183–174, 23 Jan 1965, USNM 309731.—4 ♂ (sl = 3.3–4.4 mm), 1 ♀ (sl = 2.3 mm), (1 in poor condition), sta G-1035, 24°34.70′N, 80°58.60′W, 253–357 m, 26 Feb 1969, USNM 309708.—2 ♂ (sl = 1.8, 2.9 mm), off Fowey Rocks, Florida, 137–183 m, May 1917, coll. J. B. Henderson, USNM 102659.—(right cheliped only), Fowey Rocks, Florida, 128 m, Aug 1916, USNM 102661.—1 ♂ (sl = 4.6 mm), 2 ♀ (sl = 4.3, 4.4 mm), 2 ovig ♀ (sl = 4.1, 4.3 mm), sta G-972, 24°24′N, 80°52′W, 221–230 m, 3 Feb 1968, USNM 309707.—1 ♂ (sl = 5.0 mm), 1 ovig ♀ (sl = 4.1 mm), sta G-1036, 24°22.50′N, 80°53′W, 417–433 m, 26 Feb 1969, USNM 309686.—10 ♂ (sl = 1.8–3.9 mm), 9 ♀ (sl = 2.0–4.2 mm), off Key West, Florida, sta FH-7279, 24°21.91′N, 81°58.41′, 179 m, 14 Feb 1902, USNM 151185.—3 ♂ (sl = 2.4–5.2 mm), 1 ♀ (sl = 3.0 mm), off Key West, Florida, sta FH-7282, 24°21.25′N, 81°52.25′W, 199 m, 19 Feb 1902, USNM 102660.—1 ♂ (sl = 2.6 mm), off Key West, Florida, 201 m, 1916, coll. J. B. Henderson, USNM 102586.—1 ♀ (sl = 4.0 mm), off Key West, Florida, 247 m, 1916, coll. J. B. Henderson, USNM 102588.—2 ♂ (sl = 3.7, 4.9 mm), off Key West, western Dry Rock, Florida, 263 m, 1916, USNM 309709.—1 ♀ (sl = 3.2 mm), off Key West, Florida, 263 m, 1916, USNM 102589.—1 ♂ (sl = 3.1 mm), 1 ♀ (sl = 2.2 mm), 2 ovig ♀ (sl = 2.9, 3.5 mm), SE of Key West, Florida, 112 m, (no depth, date), coll. J. B. Henderson, USNM 102584.—1 ♂ (sl = 3.8 mm), 2 ♀ (sl = 3.1, 4.7 mm), Sambo Key, Florida, 247 m, 1916, coll. J. B. Henderson, USNM 102581, USNM 102585, USNM 102587.—1 ♀ (sl = 2.3 mm), sta G-1085, 24°20′N, 82°24.50′W, 201–210 m, 26 Apr 1969, USNM 309732.—23 ♂ (sl = 3.2–5.1 mm), 1 with rhizocephalan, 17 ♀ (sl = 3.5–4.1 mm), 1 with rhizocephalan, 15 ovig ♀ (sl = 3.4–3.8), sta G-432, 24°19′N, 82°29′W, 188–199 m, 28 Nov 1964, USNM 309679.—1 ♀ (sl = 3.6 mm), Pourtales Plateau, SUIBE sta 56, 366 m, 27 Jun 1893, USNM 68977.—1 ♂ (sl = 3.0 mm), 1 ♀ (sl = 4.9 mm), 4 ovig ♀ (sl = 3.0–4.8 mm), sta FH-7283, 24°17′30″N, 81°53′30″W, 232 m, 19 Feb 1902, USNM 309710.—3 ♂ (sl = 2.5–5.9 mm), 7 ♀ (sl = 2.1–6.1 mm), 4 ovig ♀ (sl = 4.4–5.4 mm), sta G-1102, 24°15.50′N, 81°34′W, 247–283 m, 29 Apr 1969, USNM 309675.—3 ♂ (sl = 3.6, 6.0 mm), 2 ♀ (sl = 3.6, 4.8 mm), sta SB 2443, 24°08′N, 80°09′W, 329–366 m, 2 Nov 1960, USNM 309698, 309729.—3 ♀ (sl = 4.2–6.2 mm), sta SB 2445, 24°08′N, 80°08′W, 252 m, 3 Nov 1960, UMML 32:4862.—2 ♀ (sl = 3.7, 3.7 mm), sta SB 2454, 23°34′N, 79°04′W, 384–439 m, 5 Nov 1960, UMML 32:4863.

Caribbean Sea: 1 ovig ♀ (sl = 3.8 mm), sta A-2337, 23°10.65′N, 82°20.35′W, 364 m, 19 Jan 1885, USNM 9511.—1 ♂ (sl = 4.8 mm), sta SB 3510, 22°55′N, 78°36′W, 274 m, 7 Nov 1961, UMML 32:4865.—1 ♀ (sl = 4.6 mm), sta G-974, 21°13′N, 86°25′W, 247–283 m, 27 Jan 1968, USNM 309676.—1 ♂ (sl = 3.6 mm), sta G-947, 21°13′N, 86°25′W, 247–283 m, 27 Jan 1968, USNM 309706.—1 ovig ♀ (sl = 2.1

mm), sta P-594, 21°00.50′N, 86°23′W, 307–329 m, 15 Mar 1967, USNM 309687.—1 ♂ (sl = 3.2 mm), sta G-897, 20°59′N, 86°24′W, 210–292, 10 Sep 1967, USNM 309685.—4 ♂ (sl = 1.6–2.1 mm), 1 ♀ (sl = 1.9 mm), sta P-1143, 20°54.50′N, 73°28.20′W, 110–220 m, 13 Jan 1970, USNM 309700.—1 ♂ (sl = 3.1 mm), JSDSE sta 100, 18°40.25′15″N, 64°50.25′W, 274 m, 4 Mar 1933, USNM 309703.—1 ♂ (dry) (sl = 4.5 mm), sta O-5914, 18°13′N, 63°19′W, 201 m, 25 Feb 1966, USNM 309696.—1 ovig ♀ (sl = 3.9 mm), sta P-610, 17°02′N, 87°38.40′W, 296–329 m, 18 Mar 1967, USNM 309688.—1 ♂ (sl = 4.6 mm), sta O-4934, 16°32′N, 81°43′W, 101 m, 9 Jun 1964, USNM 309695.—1 ♂ (sl = 2.9 mm), sta O-4932, 16°06′N, 81°10.50′W, 165 m, 9 Jun 1964, PMcL.—7 ♂ (sl = 2.7–4.0 mm), 4 ♀ (sl = 2.5–3.0 mm), sta O-4837, 14°21′N, 80°15.50′W, 11 m, 12 May 1964, MNHN pg. 5946.—2 ovig ♀ (sl = 2.3, 2.5 mm), sta O-4832, 14°15.50′N, 80°27.10′W, 219–238 m, 12 May 1964, UMML 32:4776, USNM 309694.—1 ♀ (sl = 3.8 mm), sta O-4833, 14°15.50′N, 80°25.70′W, 155–82 m, 12 May 1964, UMML 32:4859.—1 ♂ (sl = 5.2 mm), sta P-776, 12°13.30′N, 72°50′W, 408–576 m, 29 Jul 1968, USNM 309699.—1 ♂ (sl = 3.7 mm), 1 ovig ♀ (sl = 5.9 mm), sta O-4398, 12°46′N, 70°41′W, 201 m, 26 Sep 1963, UMML 32:4858.—1 ♂ (sl = 3.2 mm), sta O-4423, 11°53′N, 69°28′W, 347 m, 5 Oct 1963, USNM 309693.—1 ♂ (sl = 4.3 mm), sta A-2125, 11°43′N, 69°09.50′W, 380 m, 18 Feb 1884, USNM 309701.

Western Atlantic, off Lesser Antilles: 2 ♂ (sl = 3.4, 6.5 mm), sta P-943, 16°25.90′N, 61°36.70′W, 274 m, 17 Jul 1969, UMML 32:4760.—1 ♂ (sl = 2.6 mm), 4 ♀ (sl = 3.7–4.9 mm), 2 ovig ♀ (sl = 4.0, 5.2 mm), sta P-890, 14°05.60′N, 60°51.40′W, 198–430 m, 7 Jul 1969, USNM 309728.—1 ♂ (sl = 4.8 mm), sta P-891, 14°05.20′N, 60°50.30′W, 477–1020 m, 7 Jul 1969, USNM 309733.—1 ♂ (sl = 5.5 mm), sta P-889, 14°04.40′N, 60°50.80′W, 177–219 m, 7 Jul 1969, UMML 32:4851.—1 ♂ (sl = 3.9 mm), sta BK-220, St. Lucia, 13°50.25′N, 61°03.75′W, 212 m, 16 Feb 1879, MCZ 2696.—3 ♂ (sl = 5.5–6.5 mm), 1 ♀ (sl = 4.6 mm), sta P-876, 13°13.90′N, 61°04.70′W, 241–262 m, 6 Jul 1969, USNM 309727.—1 ♂ (sl = 4.4 mm), 1 ♀ (sl = 3.8 mm), sta BK-223, St. Vincent, 13°08.40′N, 61°13.83′W, 267 m, 303 m, 18 Feb 1879, MCZ 4080.—4 ♂ (sl = 4.3–5.7 mm), 2 ♀ (sl = 5.1, 5.7 mm), 1 juv sex indet. (sl = 1.2 mm), sta O-5015, 13°02′N, 59°34′W, 201–247 m, 20 Sep 1964, RMNH D48673.—1 ♂ (sl = 5.1 mm), sta O-5017, 13°01.50′N, 59°39.50′W, 247–252 m, 20 Sep 1964, UMML 32:4855.—6 ♂ (sl = 4.8–7.1 mm), 8 ♀ (sl = 4.2–5.8), 2 ovig ♀ (sl = 4.7, 5.1 mm), sta O-5018, 13°00′N, 59°33′W, 320 m, 20 Sep 1964, USNM 309726.

Barbados: 1 ♀ (sl = 3.9 mm), sta BK-290, Barbados, 13°11.90′N, 59°38.75′W, 133 m, 9 Mar 1879, MCZ 2730.—1 ♀ (sl = 3.4 mm), sta BK-300, Barbados, 13°06.50′N, 59°39.33′W, 150 m, 10 Mar 1879, MCZ 2714.—2 ♂ (sl = 2.0, 2.2 mm), 225 m, 27 Nov 1962, colls. R. Work, J. Lewis.—10 ♂ (sl = 1.4–3.3 mm), 5 ♀ (sl = 2.2–2.8 mm), 3 ovig ♀ (sl = 1.3–2.8 mm), sta NR-12-4, (no depth, date), coll. J. Lewis, UMML 32:4781, USNM 309673.—1 ♀ (sl = 2.1 mm) sta NR-21-1, (no depth, date), coll. J. Lewis, PMcL.

Northeastern coast South America: 1 ♂ (sl = 5.0 mm), sta O-1989, 9°45′N, 59°45′W, (no depth), 4 Nov 1957, USNM 103390.—2 ♂ (sl = 5.6, 7.1 mm), 3 ♀ (sl = 5.8–6.9 mm), 1 ovig ♀ (sl = 5.8 mm), sta O-4304, 7°30′N, 55°00′W, 183 m, 24 Mar 1963, USNM 309725.—1 ♂ (sl = 4.9 mm), off Amazon River, sta O-2068, 2°35′N, 47°48′W, 219 m, 15 Nov 1957, USNM 103391.—3 ♂ (sl = 3.1–4.4 mm), 5 ♀ (sl = 3.3–4.6 mm), sta O-2068, 2°35′N, 47°48′W, 219 m, 15 Nov 1957, UMML 32:2471, MNHN pg-5947.—1 ovig ♀ (sl 4.0 mm), sta O-2080, 2°04′N, 47°00′W, 229 m, 17 Nov 1957, USNM 101664.—8 ♂ (sl = 3.0–4.6 mm), 9 ♀ (sl = 2.7–4.3 mm), 2 ovig ♀ (sl = 3.3, 3.4

mm), sta O-4226, 0°18′N, 44°17′W, 274 m, 9 Mar 1963, USNM 309724.

Diagnosis.—Shield (Fig. 4a) slightly longer than broad to slightly broader than long; rostrum usually reaching to mid-length of ocular acicles or beyond, broadly triangular, often terminating in small spinule; lateral projections obtusely triangular, terminating acutely or bluntly. Ocular peduncles short to very short, corneas dilated; ocular acicles triangular, acute, unarmed; separated basally by 1.50–2.00 times basal width of 1 acicle. Antennular peduncles overreach ocular peduncles by almost entire length of ultimate segment. Antennal peduncles overreach ocular peduncles at least one-half length of ultimate segment; antennal acicles reach mid-length of corneas or beyond.

Right cheliped (Figs. 4b, c, 5b–d) with chela subcircular to ovate. Dactyl broad, varying from only slightly narrower than palm to approximately one-half width of palm (dorsal view); with dorsal surface flattened or slightly convex, smooth, granular or minutely spinulose, dorsomesial margin raised as low, sometimes crenulate ridge. Palm and fixed finger circumscribed by low, smooth or crenulate ridge; dorsal surface somewhat concave (Figs. 4b, 5b, c), flattened or slightly convex (Figs. 4c, 5d), smooth, granular or minutely spinulose; dorsoproximal surface, mesial, lateral and ventral faces all with small tubercles and/or low, granular or weakly spinulose ridges, inner ventral surface of fixed finger with oval area of decalcification adjacent to articulation of dactyl. Carpus short, subtriangular to subtrapezoidal; dorsodistal margin crenulate or spinulose, dorsomesial distal angle usually with 1 or 2 acute spine, dorsal surface with short, transverse, spinulose or tuberculate ridges, dorsolateral distal angle with 1 or 2 minute spinules; ventral surface unarmed.

Left cheliped (Figs. 4d, 5a) with propodal-carpal articulation perpendicular. Dactyl unarmed or with serrate dorsomesial margin; palm and fixed finger circumscribed by low, crenulate or spinulose ridge, dorsal surface flattened or weakly convex, smooth, granular, or with scattered small spinules; dorsodistal surfaces of dactyl and fixed finger with few tufts of setae, ventrodistal surfaces each with several dense tufts of setae. Carpus subtriangular, dorsal surface strongly sloping mesially in distal half; distal margin with several small spines, dorsolateral margin with row of spines or spinulose, transverse ridges, dorsomesial surface with numerous spinulose tubercles or short, transverse, spinulose ridges.

Ambulatory legs (Fig. 6a, b) markedly compressed laterally; similar from left to right. Dactyls short and moderately to very broad, equal to or slightly shorter than propodi; with very long terminal claws; dorsal margins each with row of widely-spaced low protuberances, and frequently corneous spiniform bristles or spinules; ventral margins each with 4–6 corneous spines. Propodi also quite short, equal to or slightly longer than carpi; each usually with 3–5 corneous spines on ventral margin, dorsal margins each with usually double row of spinules or small spines, at least on second right, often giving a serrate or denticulate appearance, spines largest distally. Carpi each usually with 1 or 2 moderately strong spines at distal margin and row of small spines, spinules, or spinulose protuberances on dorsal surface (strongest on right second). Meri unarmed or with row of tiny spinules on ventral margins.

Sternite of third pereopods with semisubovate to narrowly subquadrate anterior lobe. Sternites of third to fifth pereopods each usually with several capsulate setae. Males occasionally with vas deferens protruded from one or both gonopores to form short, transparent sexual tube(s) (Fig. 4e, f).

Telson (Fig. 4h) with posterior lobes separated by very small, or often indistinct median cleft, terminal margins oblique or obliquely concave, each armed with 2–4 moderately strong spines interspersed with much smaller spines or spinules; lateral margins usually with narrow corneous or weakly calcified plate.

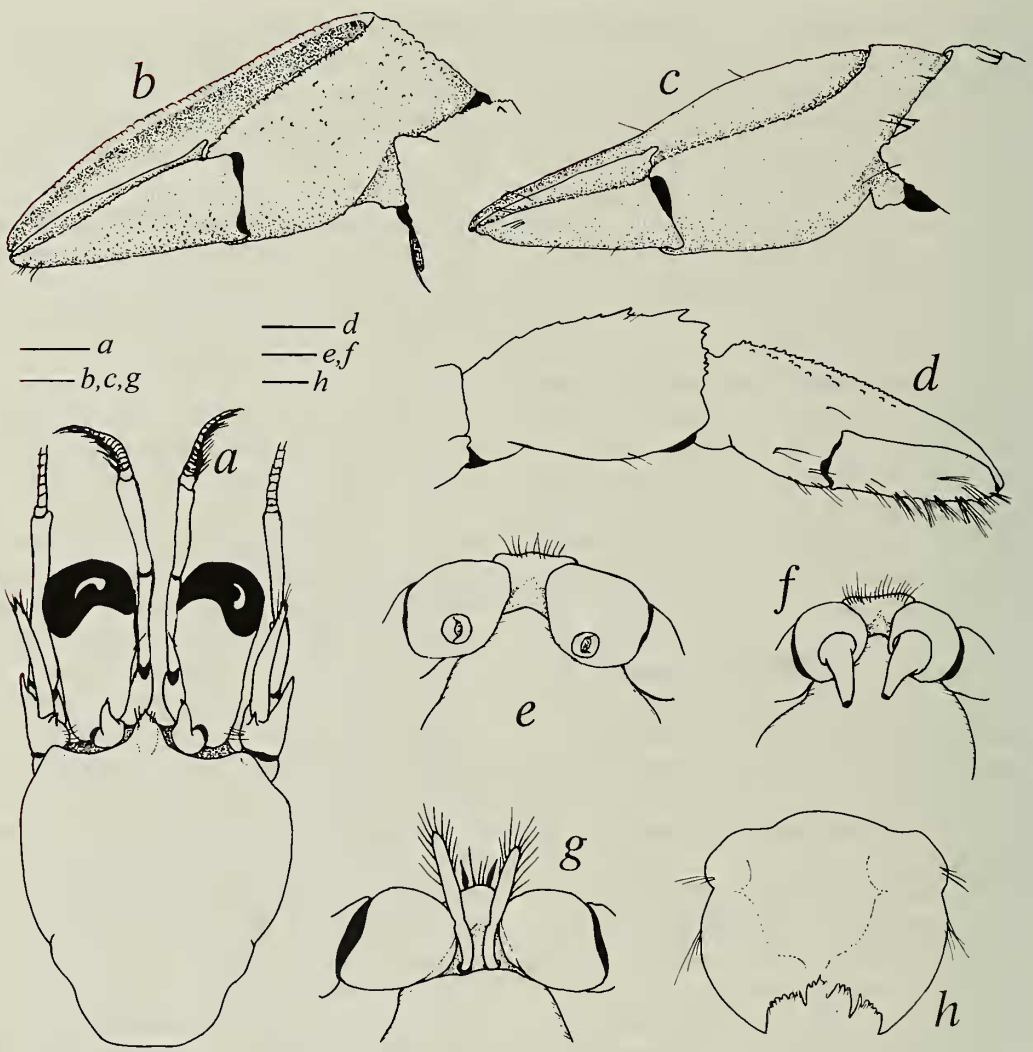

Fig. 4. *Pylopagurus discoidalis* (A. Milne-Edwards, 1880). a, b, d, h, ovig ♀ (sl = 4.9 mm), sta P-890, off Lesser Antilles, UMML 32:4756; c, ovig ♀ (sl = 3.0 mm), sta M-Dredge17, Florida Keys, USNM 173734; e, ♂ (sl = 2.1 mm), sta P-1143, Caribbean Sea, USNM 309700; f, ♂ (sl = 1.6 mm), same sta, USNM 309700; g, ovig ♀ (sl = 4.3 mm), sta G-1102, Straits of Florida, USNM 309675. a, shield and cephalic appendages, dorsal; b, c, chela, mesiodorsal; d, left carpus and chela, mesial; e, f, male coxae and sternite of fifth pereopods, sexual tubes, and part of abdomen (lower), ventral; g, female coxae and sternite of fifth pereopods, and part of abdomen (lower) showing first pleopods; h, telson, dorsal. Scales equal 1 mm (a, d), 0.5 mm (b, c, g), and 0.25 mm (e, g, h).

Color.—Variable (see Remarks).

Habitat.—Most commonly shells of scaphopod mollusks (*Dentalium* spp.), with or without an accompanying anemone.

Distribution.—Western Atlantic from North Carolina, and the Gulf of Mexico, to the northeastern coast of South America; 11–433 m, perhaps as great as 1020 m.

Remarks.—Pylopagurus discoidalis is a morphologically variably species, particularly in the shape and color of the right cheliped. Initially it was believed that two, closely allied, species were represented in the Caribbean. However, as has been demonstrated in other pagurid species, if sufficient numbers of specimens from differing

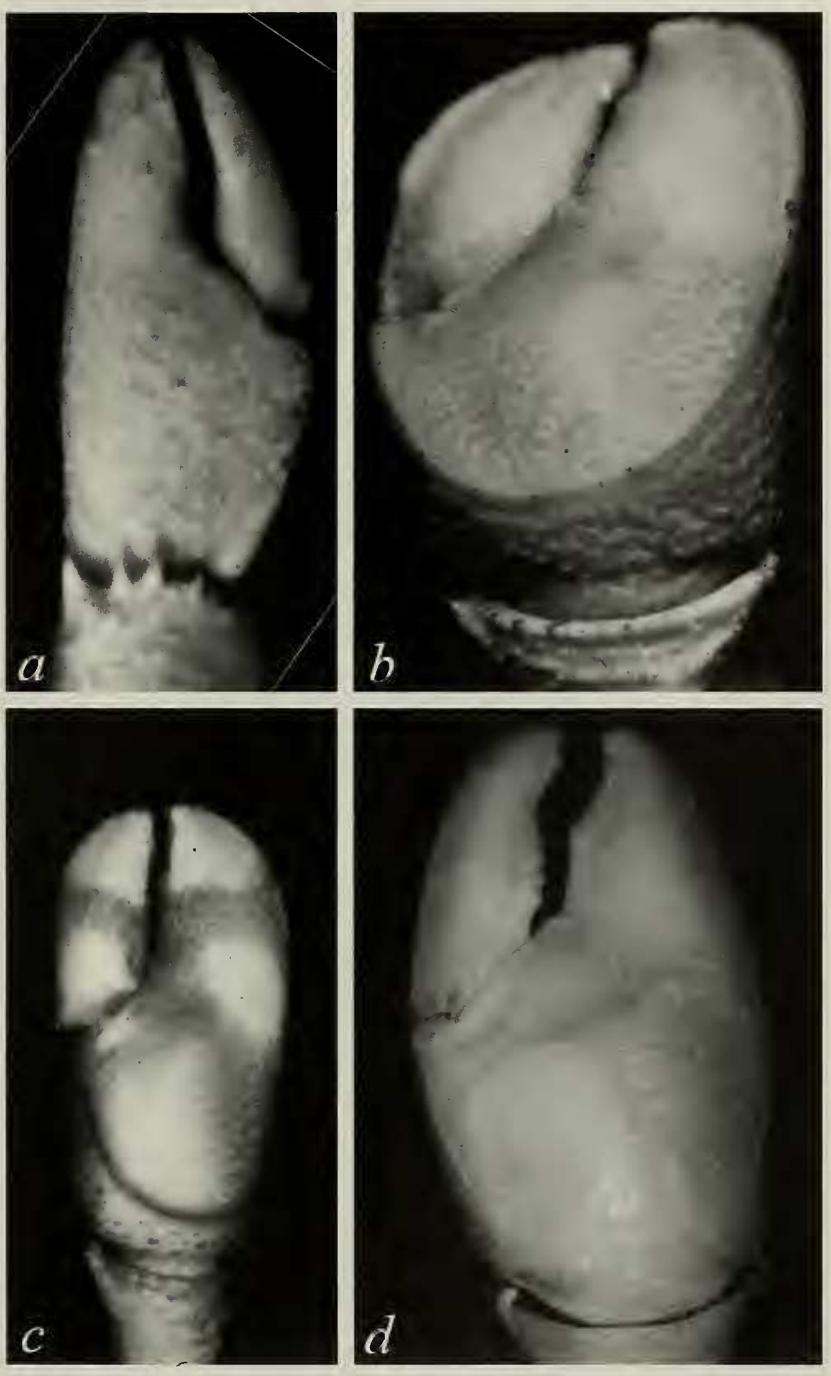

Fig. 5. Chelae of *Pylopagurus discoidalis* (A. Milne-Edwards, 1880), dorsal. a, b, holotype ♂ (sl = 5.5 mm), sta BK-157, off Montserratt, MCZ 4078; c, ♂ (sl = 6.1 mm), sta 70A10-26, Gulf of Mexico, TAM; d, ♂ (sl = 4.9 mm), sta G-610, Straits of Florida, USNM 309705. a, left (19.4×); b, right (8.1×); c, right (3.1×); d, right (8.0×).

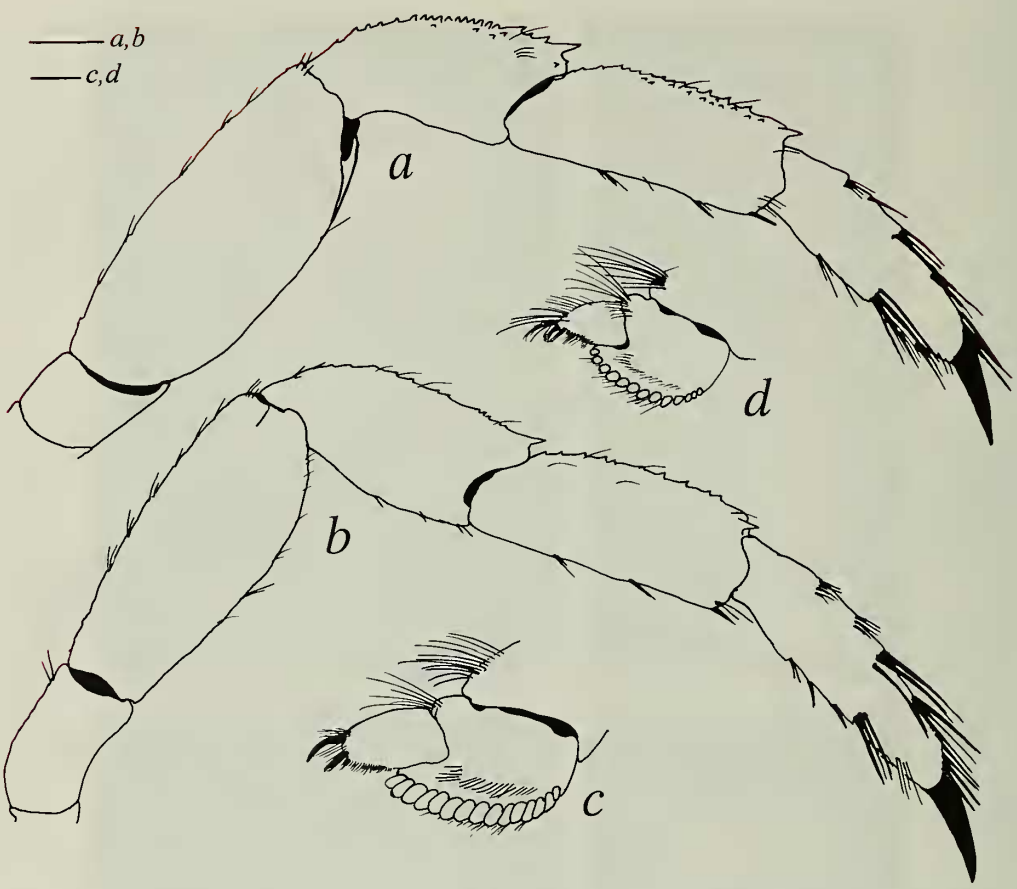

Fig. 6. *Pylopagurus discoidalis* (A. Milne-Edwards, 1880). a–c, ovig ♀ (sl = 4.9 mm), sta P-890, off Lesser Antilles, UMML 32:4756; d, ovig ♀ (sl = 3.0 mm), sta M-Dredge17, Florida Keys, USNM 173734. a, right second pereopod, lateral; b, right third pereopod, lateral; c, d, propodus and dactyl of left fourth pereopod, lateral. Scales equal 1 mm (a, b), and 0.25 mm (c, d).

localities are examined, continuums are often found. For example, variation correlated with geographic distribution was found to account for morphological differences among populations of *Pagurus lepidus* (Bouvier, 1898) (cf. Haig & McLaughlin 1991). Habitat differences in populations of *Lophopagurus* (*Australeremus*) *cookii* (Filhol, 1883) were suggested as the cause of variation in uropod symmetry observed in that species (McLaughlin & Gunn 1992), whereas sexual dimorphism contributed to the major morphological differences found in *Pagurus benedicti* (Bouvier, 1898) (cf. McLaughlin & Haig 1993).

A. Milne-Edwards & Bouvier (1893) [repeated by Williams (1984: 226) under his comments on variation] suggested that the large chela of *P. discoidalis* was initially elongate, but became more discoid with age. However, if size can be equated to advanced age, this hypothesis is not substantiated by our large sample of specimens. Rather, in *P. discoidalis* shell selection and/or association appears to greatly influence morphology. Regardless of size, virtually all the specimens that inhabited well calcified *Dentalium* sp. shells, free of epizoans, had long and relatively narrow shields and almost circular right chelae (Fig. 5b, c); the propodal rasp of the fourth pereopod consists of relatively large ovate scales (Fig.

6c). In contrast, individuals that were found occupying shells that were encrusted with, or had been decalcified or dissolved by anemones, had broader shields and more elongate chelae. In these latter specimens, the dorsal surface of the right palm was convex (Figs. 4c, 5d) rather than straight or concave and the dactyl often appreciably narrower (dorsal view) than the fixed finger; the the propodal rasp of the fourth pereopod consists of small, subcircular scales (Fig. 6d).

The color patterns of the right cheliped, although variable, appear also to be correlated with habitat. In unassociated scaphopod-dwelling *P. discoidalis* specimens, the chela is basically white with a band of red or reddish orange on dactyl and fixed finger and irregular bands on the palm (Fig. 5c). The extent of pigmentation on the palm is variable. In specimens associated with anemones, the base color of the chela is orange with ovate patches of white rimmed with orange on palm, fixed finger and dactyl. This pattern appears less variable.

Additionally, variations in ocular peduncle length and stoutness, corneal dilation, length/breadth relationships of the ambulatory dactyls and propodi, and strength of the armature of the ambulatory propodi and carpi have been observed. In contrast to size-related variations in the development of the ocular peduncles reported for juveniles (crab stages 1–10) of *Paguristes* Dana, 1851 (cf. Provenzano & Rice 1966) and *Pagurus* (cf. Carvacho 1988) in which the ocular peduncles become increasingly longer and more slender with increasing size, the opposite was found to be the case for juvenile and very young adults (sl = 2.0 mm) of *P. discoidalis*. The ocular peduncles in this size group routinely had longer, more slender ocular peduncles than were seen in larger specimens of either sex. Similarly, the younger, smaller individuals tended to have proportionately longer and more slender ambulatory dactyls than did larger individuals. Therefore, while the short, stout ocular peduncles with strongly dilated corneas are distinctive for moderate to large specimens of *P. discoidalis,* as are the short, broad ambulatory dactyls and propodi, these characters do not apply to juveniles and young adults, and will not serve to distinguish small specimens of *P. discoidalis* from other regional species. As previously indicated, small specimens of *P. discoidalis* are best distinguished from the superficially similar *P. pattiae* by the longer antennal acicles of the former species, and the stronger armature of the dorsal surface of the carpus of the left cheliped. Small specimens of *P. discoidalis* also can most easily be distinguished from *P. macgeorgei,* new species, by the armature of the carpus of left cheliped, and from *P. gorei,* new species, by the marginal or submarginal ridge that circumscribes the right chela of *P. discoidalis.*

Pylopagurus holmesi Schmitt, 1921
Figs. 7–9

Pylopagurus holmesi Schmitt, 1921:144, fig. 94 (type locality: Santa Catalina Island, California).—Walton, 1954:141, pl. 39.—Scanland & Hopkins, 1969:259.—Haig, 1977:14.—McLaughlin, 1981a: 3.

Pylopagurus longicarpus Walton, 1954: 144, pl. 40 (type locality: Puerto Refugio, Angel de la Guardia Island, Gulf of California, Mexico).—McLaughlin, 1981b: 3.

Holotype.—♂ (sl = 4.0 mm), sta T156, Santa Catalina Island, California, taken by Venice Marine Biological Station near Catalina Harbor, 23 Jun 1916, USNM 53330.

Holotype of Pylopagurus longicarpus, *Walton, 1954.*—♂ (sl = 2.0 mm), sta 1057-40, off Puerto Refugio, Angel de la Guardia Island, Gulf of California, Mexico, 51–56 fm (93.3–102.4 m), 29 Jan 1940, LACM CR19400296.

Other material examined.—Eastern Pacific: 1 ♀ (sl = 3.2 mm), near Portuguese Bend, San Pedro, California, (no depth), 23 Jun 1914, coll. A. Dohrn, USNM 50461.—1 ♂ (sl = 3.5 mm), 2 ovig ♀ (sl = 2.9, 3.6 mm), sta T155, Catalina Harbor, California,

(no depth), 23 Jun 1916, USNM 309721.—1 ♂ (sl = 3.1 mm), 7 ovig ♀ (sl = 2.2–3.0 mm), sta T154, SW Catalina Harbor, California, (no depth), 23 Jun 1916, USNM 309720.—5 ovig ♀ (sl = 2.2–3.0 mm), sta D93, near Rocky Point, California, (no depth), 10 May 1924, USNM 309722.—2 ♂ (sl = 3.6, 4.0 mm), 2 ovig ♀ (sl = 3.1, 3.7 mm), Santa Catalina Island, California, near Venice Marine Biological Station, (no depth), 23 Jun 1916, USNM 53328, 53330 (paratypes).—1 ♂ (sl = 2.4 mm), 1 ovig ♀ (sl = 2.1 mm), sta 575-36, Scripps Institution of Oceanography pier, 50-7 fm (91.4–12.8 m), 15 Sep 1915, USNM 53944.—3 ♂ (sl = 2.4–2.6 mm), 1 ovig ♀ (sl = 2.7 mm), 32°38′N, 117°14′W, (no depth), 3 Nov 1907, USNM 53945.—1 ♂ (sl = 2.2 mm), 1 ♀ (sl = 2.4 mm), sta 3788, San Diego California, (no depth, date), coll. U. S. Bureau of Fisheries, USNM 52677.—2 ♂ (sl = 3.1, 4.8 mm), 1 with rhizocephalan, 1 ♀ (sl = 3.3 mm), 1 ovig ♀ (sl = 3.9 mm), sta 1010-39, off San Benito Island, Baja California, Mexico, 130–174 m, 20 Sep 1939, LACM CR193911418.—3 ♂ (sl = 3.7–4.5 mm), 3 ♀ (sl = 2.5–4.2 mm), 5 mi (9.3 km) off San Benito Island, Mexico, 159–174 m, (no date), LACM CR15000035.—3 ♂ (sl = 2.4–2.6 mm), 3 ♀ (sl = 2.3–2.5 mm), sta 1057-40, off Puerto Refugio, Angel de la Guardia Island, Gulf of California, Mexico, 93–99 m, 29 Jan 1940, coll. B. C. Walton (as *Pylopagurus longicarpus*), LACM CR19402906.—7 ♂ (sl = 2.9–4.6 mm), 3 ovig ♀ (sl = 3.2–3.4 mm), sta 575-36, N of San Pedro Nolasco Island, Baja California, Mexico, 183 m, 12 Mar 1936, USNM 309723.

Diagnosis.—Shield (Fig. 7a) longer than broad; rostrum triangular, reaching beyond midpoint of ocular acicles, with terminal spine or spinule; lateral projections bluntly triangular, unarmed. Ocular peduncles short, stout, corneas slightly dilated; ocular acicles triangular or subovate, with strong submarginal spine; separated basally by basal width to 1.75 times basal width of 1 acicle. Antennular peduncles exceeding corneas by 0.50 or less length of ultimate antennular segment. Antennal peduncles exceeding corneas by 0.30–0.50 length of fifth antennal segment.

Right cheliped (Figs. 7b, 8b, c) subovate or subcircular. Dactyl broad, with dorsal surface flattened, smooth, dorsomesial margin raised as low, crenulate ridge. Palm and fixed finger circumscribed by low, denticulate or tuberculate ridge dorsomesially and dorsolaterally, and submarginal ridge proximally, dorsal surface flattened, smooth or minutely granular; dorsoproximal surface, mesial, lateral and ventral surfaces all with small to minute tubercles or spinules. Carpus varying from short and broad to moderately elongate and subrectangular, dorsomesial and dorsolateral margins not delimited, surfaces all with closely-spaced small spinules or spinulose tubercles. Merus usually with spinulose or granular ventral surface, ventrodistal margins spinulose or serrate.

Left cheliped (Figs. 7c, 8a) with brush formed of tufts of stiff setae on ventral surface of dactyl and fixed finger; dorsomesial and dorsolateral margins of palm each with very low spinose or spinulose ridge, dorsal surface grenally flattened, minutely spinulose. Carpus subtriangular, with row of small spines on dorsolateral margin, dorsal surface spinulose, distal margin with several stronger spines extending mesially and laterally.

Ambulatory legs (Fig. 9) somewhat compressed laterally; similar from left to right. Dactyls equal or slightly longer than propodi, with moderate to long corneous claws; dorsal margins each with row of long, corneous, spiniform bristles, ventral margins each with row of 4–6 corneous spines. Propodi each with row of small spines on dorsal surface (strongest on second) and usually accompanied mesially by 1–3 irregular rows of much smaller spinules, ventral surfaces of second each with row of widely-spaced corneous bristles or spines, ventrodistal margins of third each with pair of corneous spines. Carpi each

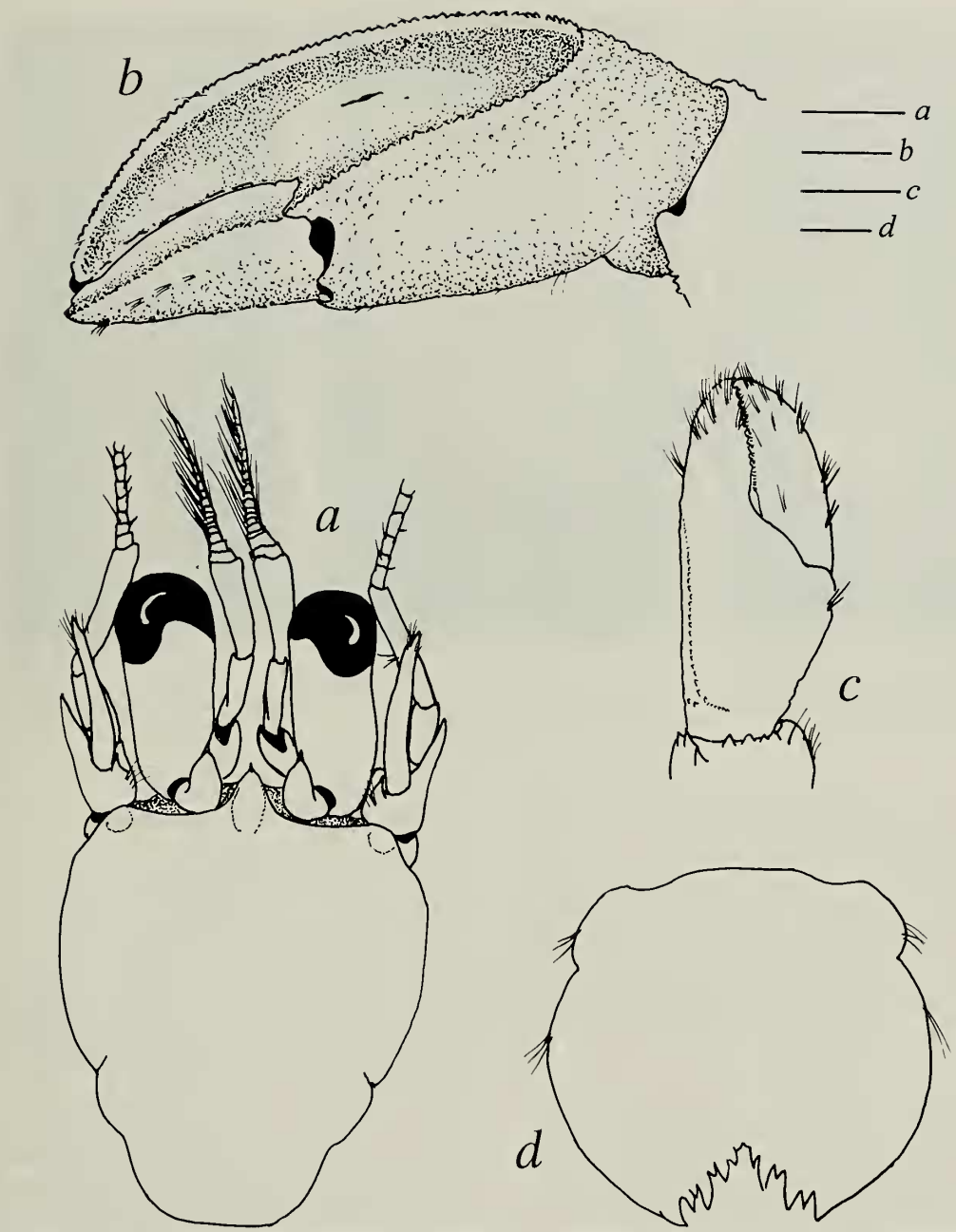

Fig. 7. *Pylopagurus holmesi* Schmitt, 1921, holotype ♂ (sl = 4.0 mm), sta T156, Santa Catalina Island, California, USNM 53330. a, shield and cephalic appendages, dorsal; b, right chela, mesiodorsal; c, left chela, dorsal; d, telson, dorsal. Scales equal 1 mm (a–c), and 0.25 mm (d).

with row of small spines on dorsal margin (largest on second), and accompanied by 1–3 irregular rows of much smaller spinules laterally. Meri with dorsal margins of second unarmed, dorsal margins of third each with row of small corneous spines.

Sternite of third pereopods with small, subovate to subquadrate anterior lobe.

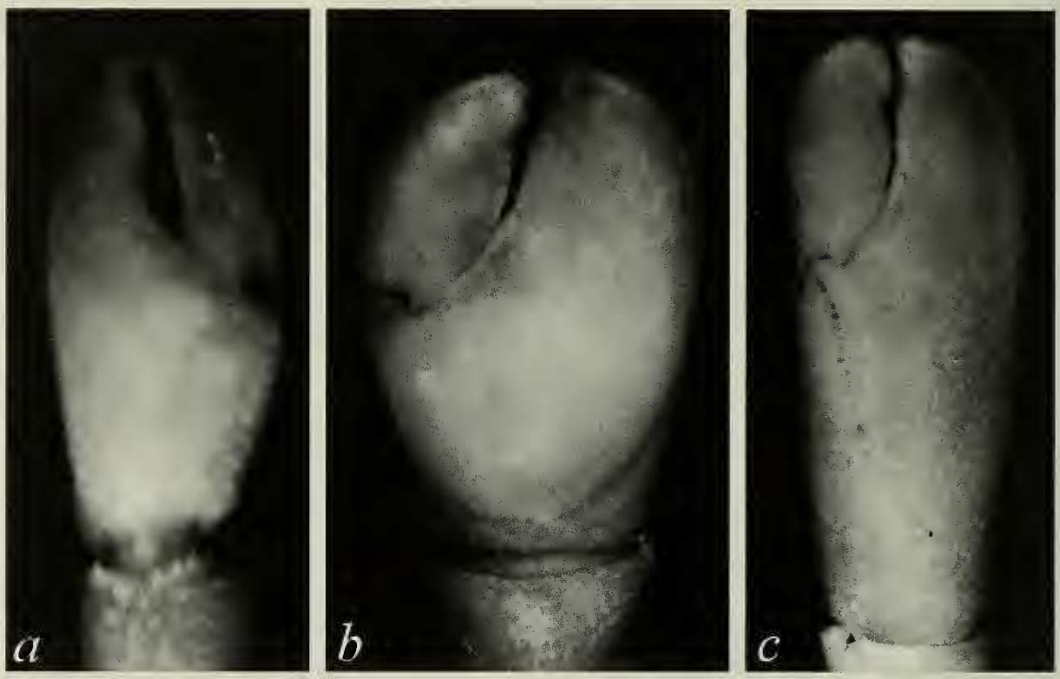

Fig. 8. Chelae of *Pylopagurus holmesi* Schmitt, 1921, dorsal. a, b, ♀ (sl = 3.3 mm), sta 1010-39, Baja California, Mexico, LACM CR193911418; c, ♂ (sl = 2.5 mm), sta 1057-40, Gulf of California, Mexico, LACM CR19402906. a, left (28.1×); b, right (14.4×); c, right (14.3×).

Males apparently without vas deferens produced as short sexual tube(s).

Telson (Fig. 7d) with posterior lobes separated by small median cleft; terminal margins oblique, each with 1–5 blunt or acute spines, strongest at outer angle, lateral margins angular or rounded, each with narrow corneous or weakly calcified plate.

Color.—Unknown.

Habitat.—Walton (1954) reported that specimens he identified as *P. holmesi* occupied *Dentalium* sp. shells and occasionally a tubular bryozoan colony [*Antropora tincta* (Hastings)], whereas specimens he considered to represent *P. longicarpus* were found predominantly in chitinous tubes of the polychaete *Hyalinoecia juvenalis* Moore. Specimens that we examined that were still accompanied by their "housing", occupied scaphopod shells encrusted with a bryozoan.

Distribution.—Eastern Pacific from Channel Islands, California to Baja California and Gulf of California, Mexico; 2–457 m (Walton 1954).

Remarks.—Schmitt (1921) related *P. holmesi* to the western Atlantic *P. discoidalis,* and the two certainly can be considered geminate species. In describing a new species, *P. longicarpus,* from the Gulf of California, Mexico, Walton (1954) separated his taxon from *P. holmesi,* as his specific epithet reflects, by the elongate right chelipeds of males. He noted that "younger forms" and females were practically indistinguishable from *P. holmesi.* Although we have examined only a relatively few specimens, other than the length/width ratio of the carpus and chela of the right cheliped (Fig. 8b, c) in the largest males of *P. longicarpus,* we could find no morphological distinctions between the two taxa. Considering the morphological variability observed in specimens of *P. discoidalis* that appear to be influenced by habitat, it is probable that a similar situation accounts

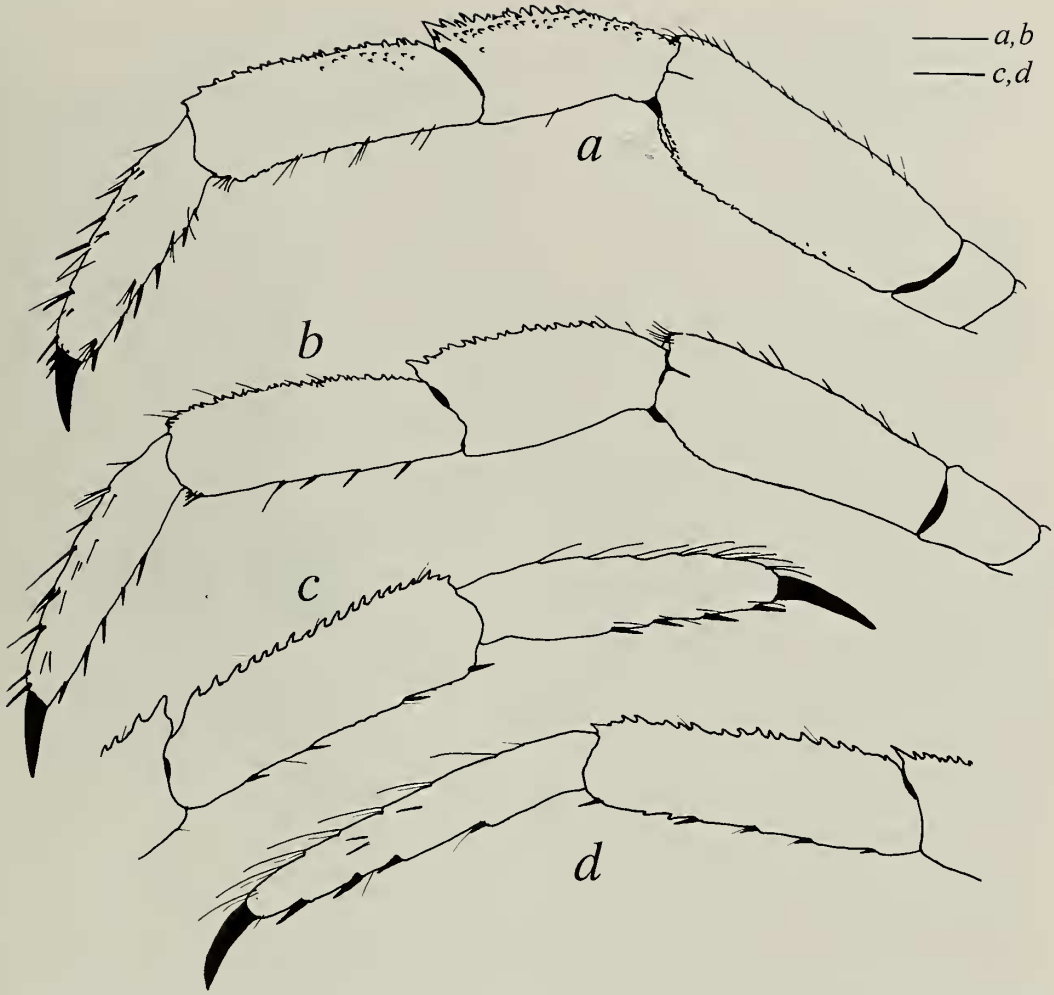

Fig. 9. *Pylopagurus holmesi* Schmitt, 1921. a, b, holotype ♂ (sl = 4.0 mm), sta T156, Santa Catalina Island, California, USNM 53330; c, d, ♂ (sl = 2.5 mm), sta 1057-40, Gulf of California, Mexico, LACM CR19402906. a, left second pereopod, lateral; b, left third pereopod, lateral; c, propodus and dactyl of left second pereopod, mesial; d, propodus and dactyl of left third pereopod, lateral. Scales equal 1 mm (a, b), and 0.5 mm (c, d).

for the cheliped variations seen in the Pacific species.

In our small sample of Walton's (1954) *P. longicarpus,* there appears to be some slight differences in the length of the ambulatory dactyls relative to that of the propodi (Fig. 9c, d) from those of Schmitt's (1921) *P. holmesi* (Fig. 9a, b). However, Walton referred to the "heterogonic" growth most apparent in the form of the right cheliped, but also occurring in the other appendages as well. Considering the small size of *P. longicarpus* (mean of 33 specimens given as 2.0 mm; Walton 1954: 145), it is probable that the observed differences are attributable to size differences, as has been discussed for *P. discoidalis.*

Walton (1954:143) remarked on the broad bathymetric range of *P. holmesi* ("from one . . . to 250 fms"), which is unusual for a subtropical species, and might give cause to believe that two taxa had been confounded. We have not reexamined all of Walton's material, but the depth distribution of his *P. longicarpus* falls well within the range of *P. holmesi* from Schmitt's (1921)

original material and from subsequent collections in the San Diego area. The Atlantic geminate species, *P. discoidalis,* has an even broader bathymetric range.

Pylopagurus macgeorgei, new species
Figs. 10, 11a, b, 12

Holotype.—ovig ♀ (sl = 3.9 mm), sta B78-8, S of Cay Sal, Cay Sal Banks, Bahamas, 23°35′N, 80°22′W, 453 m, 15 May 1978, USNM 306889.

Paratypes.—Straits of Florida: 4 ♂ (sl = 2.5–2.9 mm), 3 ♀ (sl = 2.5–2.9 mm), 1 ovig ♀ (sl = 2.6 mm), sta G-524, 26°17′N, 78°41′W, 513–715 m, 3 Mar 1965, USNM 306890.—1 ♂ (sl = 3.9 mm), SB sta 3515, 24°03′N, 79°31′W, 576 m, 8 Nov 1961, SNHM 5267.

Caribbean Sea: 1 ♂ (sl = 1.9 mm), off St. Lucia, Lesser Antilles, sta P-889, 14°04.40′N, 60°50.80′W, 668–725 m, 7 Jul 1969, RMNH D48670.—1 ♀ (sl = 4.2 mm), Gulf of Morrosquillo, Colombia, sta AN-E67, 9°45.36′N, 76°15.35′W, 269–300 m, 13 Apr 1999, INVEMAR-CRU 2062.

Description.—Shield (Fig. 10a) appreciably longer than broad; anterior margin between rostrum and nearly obsolete lateral projections nearly straight; anterolateral margins sloping; posterior margin truncate; dorsal surface glabrous. Rostrum broadly triangular, with acute distinct terminal spine. Lateral projections rounded, unarmed.

Ocular peduncles (including corneas) 0.50 or slightly less than 0.50 length of shield, moderately slender proximally, broadening distally; peduncles twice to 2.50 times as long as shield (corneal diameter included). Ocular acicles very narrowly triangular, terminating acutely, with small submarginal spine; separated basally by approximately twice basal width of 1 acicle.

Antennular peduncles overreaching distal margins of corneas by 0.50–0.90 times length of ultimate segment. Ultimate and penultimate segments with sparse scattered short setae. Basal segment with very small spine on lateral face dorsally.

Antennal peduncles overreaching distal margins of corneas by 0.35–0.50 times length of ultimate segment. Fifth and fourth segments with scattered short setae. Third segment with tiny spinule at ventrodistal angle. Second segment with dorsolateral distal angle produced, terminating in bifid spine; dorsomesial angle with small spine. First segment produced ventrally and with spinule at ventrolateral margin. Antennal acicles reaching or overreaching distal margins of corneas; reaching to or nearly to mid-length of fifth peduncular segment. Flagellum with 2 or 3 long and 1 or 2 short setae every article, at least in proximal half. Sternite of third maxillipeds unarmed or with tiny spinule on either side of median cleft.

Right cheliped (Figs. 10b, 11b) moderately stout. Dactyl approximately 0.75 times length of palm; dorsomesial margin developed as thin elevated ridge in proximal 0.65, horizontal distally; dorsal surface weakly convex, unarmed; cutting edge calcareous with 1 weakly developed tooth distally; terminating in small corneous claw and slightly overlapped by fixed finger; ventral surface with few tufts of short setae. Palm about as long as broad or slightly longer than broad; dorsal surface weakly convex (Fig. 10b), unarmed, dorsal surface of fixed finger weakly concave; dorsomesial and dorsolateral margins elevated to form marginal ridge, joined by similar ridge proximally on palm, adjacent proximal area with scattered very low protuberances and sparse very short setae; mesial, lateral and ventral surfaces also with few sparse tufts of short setae; cutting edge of fixed finger calcareous, with 1 broad calcareous tooth. Carpus 0.60–0.70 times length of merus, roundly subtriangular; dorsomesial and dorsolateral margins not delimited, dorsomesial distal angle with very small spine; dorsal surface with few low, sometimes spinulose protuberances laterally; other surfaces unarmed. Merus triangular; dorsodistal

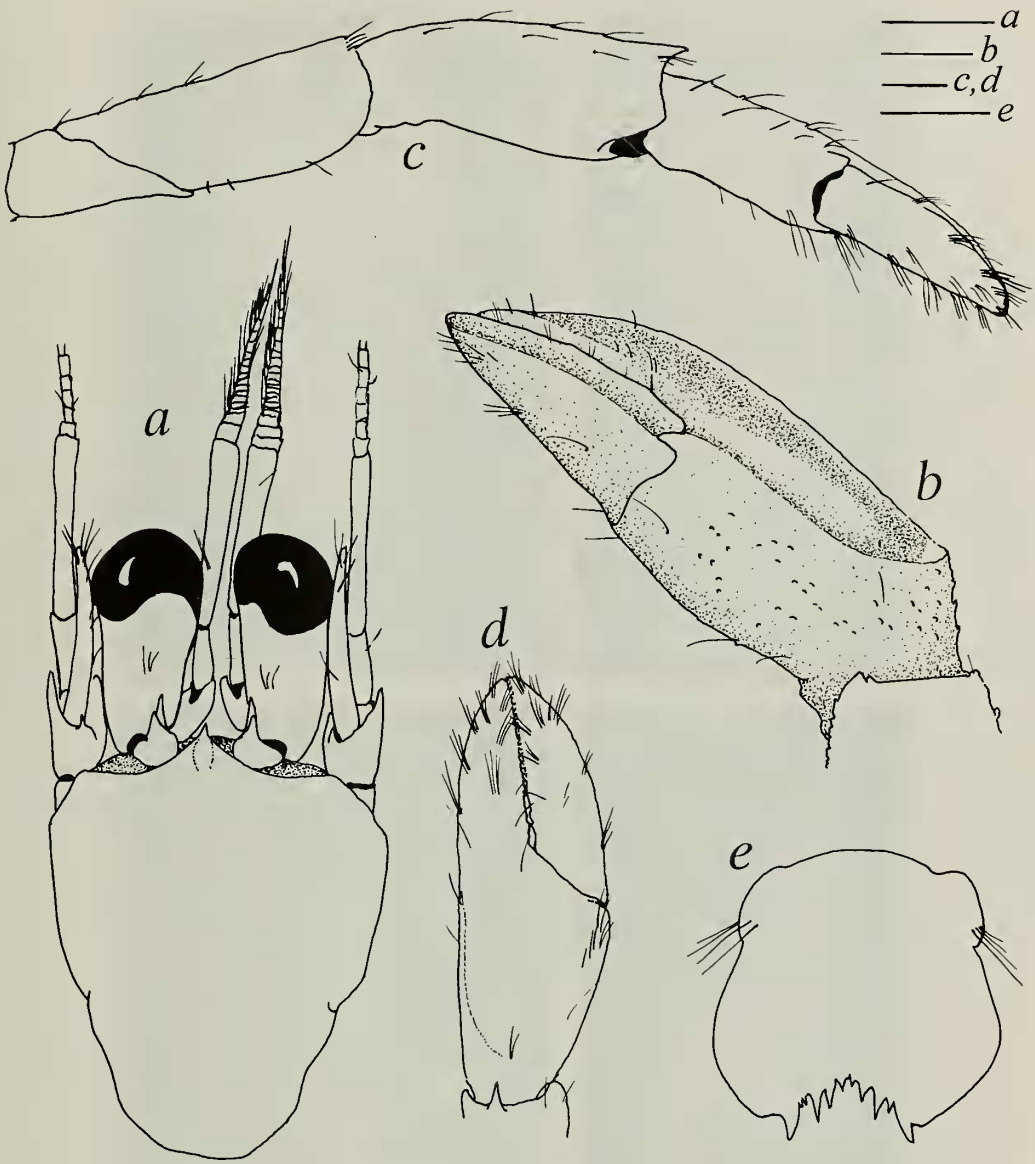

Fig. 10. *Pylopagurus macgeorgei,* new species, holotype ovig ♀ (sl = 3.9 mm), FIU sta B78-8, Cay Sal Banks, USNM 306889. a, shield and cephalic appendages, dorsal; b, right chela, mesiodorsal; c, left cheliped, mesial; d, chela of same, dorsal; e, telson, dorsal. Scales equal 1 mm (a, b), and 0.5 mm (c-e).

margin with 1–4 small spines and several short stiff setae; other margins and surfaces unarmed, but with scattered short setae. Ischium unarmed.

Left cheliped (Figs. 10c, d, 11a) with dactyl slightly longer than palm; surfaces of dactyl, fixed finger and palm all unarmed except for sparse tufts of setae and minute tubercles on dorsoproximal face of palm. Carpus approximately equal to length of merus; dorsodistal margin with small to moderately large spine, dorsal surface with sparse row of tufts of setae; other surfaces unarmed and nearly glabrous. Merus with stiff setae on dorsodistal margin. Ischium unarmed.

Fig. 11. Chelae of *Pylopagurus macgeorgei,* new species (a, b), and *P. gorei,* new species (c, d), dorsal. a, b, paratype ovig ♀ (sl = 2.6 mm), Straits of Florida, USNM 306890; c, d, paratype ♂ (sl = 3.8 mm), sta O-4572, Gulf of Mexico, USNM 306892. a, left (36.9×); b, right (13.4×); c, left (24.3×); d, right (12.2×).

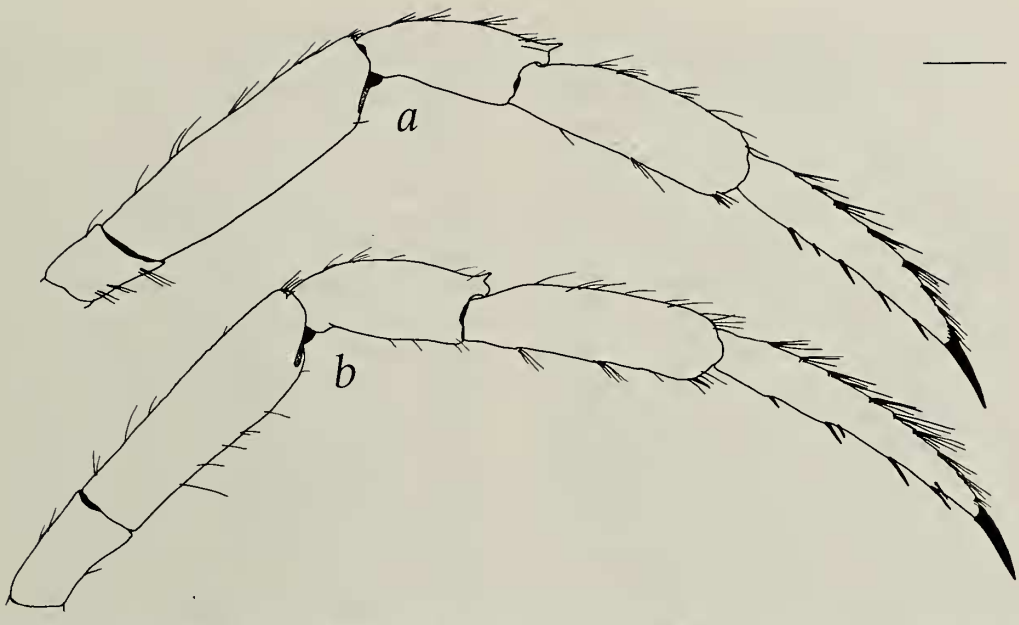

Fig. 12. *Pylopagurus macgeorgei,* new species, holotype ovig ♀ (sl = 3.9 mm), FIU sta B78-8, Cay Sal Banks, USNM 306889. a, right second pereopod, lateral; b, right third pereopod, lateral. Scale equals 1 mm.

Ambulatory legs (Fig. 12) moderately short; similar from left to right. Dactyls about 1.50 times or more as long as propodi; dorsal surfaces each with row of widely-spaced protuberances, each with 1–3 long stiff setae; ventral margins each with row of 5 or 6 corneous spines and few short setae. Propodi 1.25–1.35 times length of carpi; dorsal surfaces each with row of widely-spaced sparse tufts of stiff setae; ventrodistal margins each with 1 or 2 corneous spines, longest on second. Carpi 0.45–0.65 times length of meri, each with prominent dorsodistal spine (smaller on third pereopods), and tufts of setae, at least dorsally. Meri and ischia unarmed, but with dorsal and often also ventral sparse tufts of setae.

Sternite of third pereopods with small, subquadrate or subovate anterior lobe. Sternites of fourth and fifth pereopods in males with capsulate setae. Males often with vas deferens slightly produced on one or both coxae of fifth pereopods to form short, transparent sexual tube(s).

Telson (Fig. 10e) with weak transverse indentation suggesting division into anterior and posterior portions; posterior lobes approximately equal, separated by distinct medial cleft; terminal margins somewhat concave, each with 2 or 3 slender spines interspersed with smaller spines; prominently produced acute or subacute outer angles.

Color.—In life, body and appendages without color.

Habitat.—Scaphopod shells accompanied by anemone.

Distribution.—Western Atlantic and Caribbean Sea, from Bahamas to off Barbados and Colombia; 453–715 m.

Etymology.—This species is dedicated to the late E. J. McGeorge, whose photographs have augmented the descriptions of nearly all of the "*Pylopagurus-Tomopagurus*" group species.

Remarks.—*Pylopagurus macgeorgei,* new species, is superficially quite similar to *P. pattiae,* and because of variation, the only morphological characters truly diagnostic for separating the two taxa are the lengths of the antennal acicles and the armature of

the terminal margins of the telson. In *P. pattiae,* the antennal acicles are quite short, rarely reach beyond the bases of the corneas (Fig. 2a); the terminal margins of the telson have one to three short spines (Fig. 2h). In contrast, the antennal acicles of *P. macgeorgei* reach to or beyond the distal corneal margins (Fig. 10a); the terminal margins of the telson each have two or three long, slender spines interspersed with short spines (Fig. 10e). Additionally, the ocular and antennal acicles of *P. macgeorgei* are much narrower than those of *P. pattiae,* and the dactyls of the ambulatory legs are longer (1.50 times or more as long as the propodi). In life, color, or the lack of all color in *P. macgeorgei* will serve to distinguish this taxon.

Equally important is the fact that the two species occupy distinctly different habitats. *Pylopagurus macgeorgei* has only been found in scaphopod shells each with an attached anemone, and at depths in excess of 453 m. In contrast, *P. pattiae* is a relatively shallow-water species (20–82 m) that has been found almost exclusively in corneous, semi-transparent tubes built by polychaetes of the family Onyphidae.

Pylopagurus gorei, new species
Figs. 11c, d, 13

Holotype.—ovig ♀ (sl = 3.0 mm), sta O-4572, 23°23′N, 86°56′W, 549 m, 8 Dec 1953, USNM 306891.

Paratypes.—Eastern coast of United States: 1 ♂ (sl = 1.8 mm), off Florida, 29°38′N, 79°53′W, 520 m, 1 Sep 1977, coll. K. Shaw, USNM 174391.

Gulf of Mexico: 2 ♂ (sl = 3.0–3.8 mm), 1 ♀ (sl = 3.1 mm), sta O-4572, 23°23′N, 86°56′W, 549 m, 8 Dec 1953, USNM 306892.—3 ♂ (sl = 1.5–2.7 mm), sta P-904, 13°45.50′N, 61°05.70′W, 417–589 m, 9 Jul 1969, SMNH 5265, 5266.

Caribbean Sea: 1 ovig ♀ (sl = 2.5 mm), sta SB-3515, Bahamas, 24°03′N, 79°31′W, 576 m, 8 Nov 1961, USNM 306894.—6 ♂, 3 with rhizocephalans (sl = 2.0–2.7 mm), 1 ♀ with rhizocephalan (sl = 2.2 mm), sta P-607, 18°30′N, 87°37′W, 715–787 m, 17–18 Mar 1968, RMNH D48669, USNM 306893.

Description.—Shield (Fig. 13a) longer than broad; anterior margin between rostrum and broadly rounded lateral projections straight or weakly concave; anterolateral margins sloping; posterior margin truncate; dorsal surface glabrous. Rostrum triangular, with acute terminal spine or spinule. Lateral projections unarmed.

Ocular peduncles short, moderately stout, less than 0.50 length of shield, broadening distally. Ocular acicles triangular, terminating acutely, with simple or minutely bifid submarginal spine; separated basally by approximately basal width of 1 acicle.

Antennular peduncles overreaching distal margins of corneas by 0.80–0.95 times length of ultimate segment. Ultimate and penultimate segments with sparse scattered short setae. Basal segment with very tiny spinule on lateral face dorsally.

Antennal peduncles overreaching distal margins of corneas by 0.75–0.90 times length of ultimate segment. Fifth and fourth segments with scattered short setae. Third segment unarmed or with tiny spinule at ventrodistal angle. Second segment with dorsolateral distal angle produced, terminating in simple or weakly bifid spine; dorsomesial angle with small spine. First segment produced ventrally, unarmed. Antennal acicles reaching beyond distal margins of corneas, but usually not reaching beyond mid-length of fifth peduncular segment. Flagellum with 1 or 2 moderately long and 1 or 2 short setae every 1–3 articles, at least in proximal half. Sternite of third maxillipeds with spine on either side of midline.

Right cheliped (Figs. 11d, 13b) moderately long and slender. Dactyl approximately 0.65–0.75 times length of palm; dorsomesial margin developed as thin slightly elevated, minutely serrate ridge, dorsal surface weakly convex, unarmed; cutting edge with 2 partially coalesced calcareous teeth proximally, 1 more weakly developed tooth

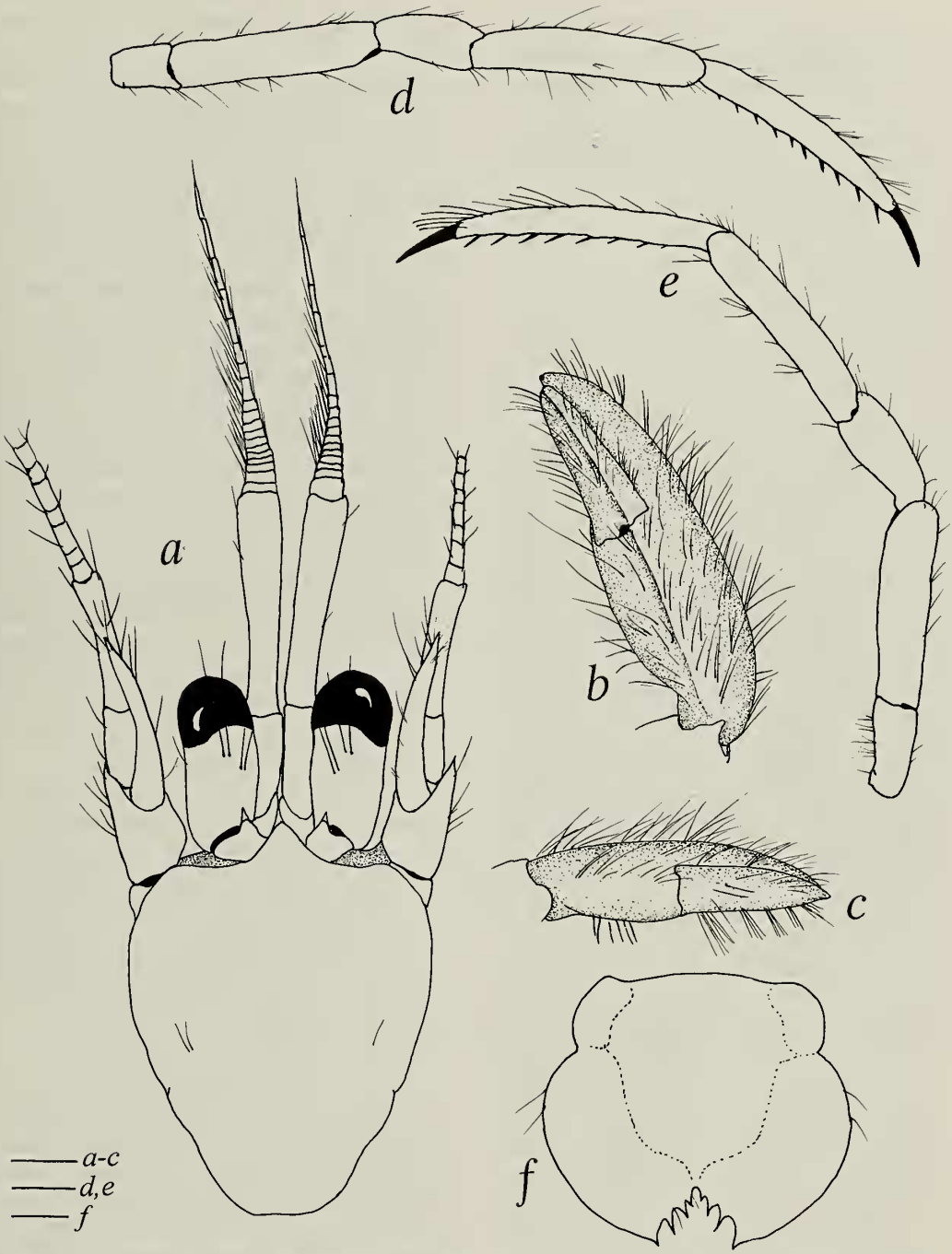

Fig. 13. *Pylopagurus gorei,* new species, paratype ♂ (sl = 3.0 mm), Gulf of Mexico, sta O-4572, USNM 306892. a, shield and cephalic appendages, dorsal; b, right chela, mesial; c, left chela, mesial; d, right second pereopod, lateral; e, right third pereopod, mesial; f, telson, dorsal. Scales equal 0.5 mm (a–c, 1 mm (d, e), and 0.1 mm (f).

distally separated by row of tiny calcareous teeth; terminating in small corneous claw and slightly overlapped by fixed finger; mesial and ventral surfaces with sparse tufts of short setae. Palm (Fig. 13b) approximately 1.25–1.40 times as long as broad; dorsal surface convex, unarmed, but with sparse covering of moderately long setae, dorsal surface of fixed finger weakly concave; dorsomesial and dorsolateral margins elevated to form low, smooth or microscopically serrate ridges; mesial, lateral and ventral surfaces with sparse tufts of short setae; cutting edge of fixed finger marginally calcareous, with 1 broad calcareous tooth approximately at mid-length. Carpus as long as or slightly longer than merus, roundly subtrapezoidal; dorsomesial margin rounded, dorsomesial distal angle with very prominent spine; dorsolateral margin not delimited, convex dorsal surface with numerous moderately long setae; mesial face concave below produced dorsomesial angle, and with numerous very short, very low transverse ridges accompanied by fine setae; lateral and ventral surfaces convex, with scattered setae. Merus triangular; dorsodistal margin with few setae; ventromesial margin with 1 or 2 small blunt tubercles; ventrolateral margin unarmed, surfaces and margins all with scattered setae. Ischium unarmed.

Left cheliped (Figs. 11c, 13c) with dactyl equal to or slightly longer than palm; surfaces of dactyl, fixed finger unarmed but with numerous sparse tufts of long setae; palm with dorsolateral margin delimited by very weak ridge, dorsal surface somewhat elevated in midline, and usually with short row of very tiny blunt or spinulose granules; other surfaces with numerous moderately long to long, fine setae. Carpus approximately equal to length of merus; dorsomesial and dorsolateral distal angles each with prominent spine, dorsal surface with faint row of low protuberances and tufts of setae mesially and laterally, other surfaces unarmed but with sparse tufts of moderate to long setae. Merus unarmed, but with setae dorsally and ventrally. Ischium unarmed.

Ambulatory legs (Fig. 13d, e) moderately long and slender; similar from left to right. Dactyls equal to or longer than propodi; dorsal surfaces with each with row of low protuberances and sparse tufts of long or moderately long setae; ventral margins each with row of 6–8 corneous spines and few short setae. Propodi 1.25 times to nearly twice length of carpi; dorsal surfaces each with row of very low, widely-spaced protuberances and sparse tufts of setae; ventrodistal margins sometimes with 1 stiff bristle. Carpi 0.45–0.65 times length of meri, unarmed but with sparse tufts of setae dorsally and ventrally. Meri and ischia unarmed, but with dorsal and ventral sparse tufts of setae.

Sternite of third pereopods with small, subquadrate or subovate anterior lobe, in males sometimes partially concealed by 1 or 2 capsulate setae. Sternites of fourth and fifth pereopods in males also with capsulate setae. Males without vas deferens produced from gonopores into short tubes.

Telson (Fig. 13f) with weak transverse indentation suggesting division into anterior and posterior portions; posterior lobes approximately equal, separated by distinct median cleft; terminal margins somewhat concave, each with 2–4 usually slender spines sometimes interspersed with smaller spines; prominently produced acute or subacute outer angles.

Color.—Unknown.

Etymology.—This species is named for Dr. Robert H. Gore, esteemed friend and colleague, who, during his tenure in carcinology, contributed substantially to our knowledge of systematics, evolution, and development in decapods, and who is still willing to share from his bountiful reservoir of information on the subjects.

Habitat.—Has only been found inhabiting scaphopod shells, frequently encrusted with bryozoans.

Distribution.—Broadly, but uncommonly distributed in the western Atlantic from the

Gulf of Mexico to the Lesser Antilles; 417–787 m.

Remarks.—Pylopagurus gorei, new species, is a member of that group of species in the genus that are characterized by an absence of strong spines on the propodi and carpi of the ambulatory legs. This species is readily distinguished from *P. macgeorgei,* new species, and *P. pattiae* by the absence of an elevated ridge on the posterior dorsal surface of the palm of the right cheliped (Figs. 11d, 13b), and the absence of a dorsodistal carpal spine on the ambulatory legs (Fig. 13d, e).

In contrast to the "feminizing" effect of rhizocephalan infestation seen in some "*Pylopagurus-Tomopagurus*" group species (see Remarks under *P. pattiae*), we found no evidence of morphological alteration in either males or females of *P. gorei,* similarly infected. Nor was any development of short sexual tubes apparent either in infected or uninfected specimens.

Key to species of *Pylopagurus*

1. Antennal acicles short, usually not reaching to bases of corneas, rarely only slightly beyond; dorsal margins of propodus and carpus of right second pereopod unarmed, or rarely microscopically serrate ..... *P. pattiae* (western Atlantic)
– Antennal acicles long or moderately long, reaching at least to mid-length of corneas, often beyond distal margins; dorsal margins of propodus and carpus of right second pereopod variable 2
2. Dorsal surfaces of propodi and carpi of ambulatory legs distinctly denticulate, serrate or spinose 3
– Dorsal surfaces of propodi and carpi of ambulatory legs smooth or with only minute protuberances 4
3. Antennular peduncles overreach distal margins of corneas by nearly entire length of ultimate segment; antennal peduncles overreach distal margins of corneas by more than half length of ultimate segment .. *P. discoidalis* (western Atlantic)
– Antennular peduncles overreach distal margins of corneas by 0.25–0.50 times length of ultimate segment; antennal peduncles reach to distal margins of corneas or beyond by no more than half length of ultimate segment ....*P. holmesi* (eastern Pacific)
4. Chela of right cheliped circumscribed by raised, smooth or crenulated ridge .... *P. macgeorgei,* new species ..... (western Atlantic)
– Chela of right cheliped not circumscribed by raised, smooth or crenulated ridge .... *P. gorei,* new species (western Atlantic)

Pylopaguridium, new genus

Type species.—Pylopaguridium markhami, new species. Gender: neuter.

Diagnosis.—Eleven pairs of biserial gills. Strongly armed lateral projections widely separated from acute rostrum. Ocular acicles multispinose. Maxillule (Fig. 1g) with external lobe of endopod moderately well developed, not recurved, internal lobe with 1 terminal bristle. Maxilla (Fig. 1h) with proximal lobe of scaphognathite moderately narrow. First maxilliped (Fig. 1i) with slender exopod. Third maxilliped with well developed crista dentata and prominent accessory tooth; merus with prominent spine at dorsodistal margin. Sternite of third maxillipeds unarmed.

Right cheliped markedly larger than left, subrectangular, operculate; angle of articulation of chela and carpus generally perpendicular. Left cheliped with chela small; dactyl and fixed finger dorsoventrally compressed; palm flattened, slightly concave or slightly convex; angle of articulation of chela and carpus perpendicular or only slightly twisted. Ambulatory legs with dorsodistal carpal spine. Fourth pereopods (Fig. 16e) with very small preungual process (not apparent in Fig. 16e, visible under high magnification) on dactyl; propodal rasp consisting of single row of corneous scales.

Sternite of third pereopods with subsemicircular or subovate anterior lobe. Sternites of pereopods 4 and 5 broad. Males with paired gonopores; coxae of fifth pereopods

asymmetrical; left produced posteriorly as rounded, gonopore-bearing lobe; gonopore partially masked by tuft of stiff setae on posterior margin, directed anteriorly; 3 unpaired unequally biramous left pleopods (3–5); exopods long, slender, endopods reduced. Females with paired gonopores on coxae of third pereopods; paired first pleopods incompletely 2-segmented and modified as gonopods (Fig. 15g), and 4 unpaired biramous left pleopods, second through fourth with both rami well developed, fifth as in male.

Abdomen flexed. Uropods asymmetrical. Telson with lateral indentations suggesting division into anterior and posterior portions; posterior lobes symmetrical or only slightly asymmetrical, terminal margins armed with 2 to several small spines.

Etymology.—A combination of *Pylo,* indicating the relationship to the "*Pylopagurus-Tomopagurus*" group genera, and *Paguridium,* referring to the genus typified by the enlarged coxa of the male left fifth pereopod.

Distribution.—Western Atlantic from Bahamas to Caribbean Sea off eastern Honduras.

Remarks.—This genus, at present monotypic, while related to other "*Pylopagurus-Tomopagurus*" group genera by the gill number and structure and presence in females of paired first pleopods, is distinguished from all other "*Plyopagurus-Tomopagurus*" group genera, by the asymmetry of the coxae of male fifth pereopods. Additionally, the broad sternal plates of the third through fifth pereopods (thoracic sternites 6–8) are not commonly seen in the majority of "*Pylopagurus-Tomopagurus*" group genera; however, this character may be more strongly influenced by habitat preferences than genetics.

Pylopaguridium markhami, new species
Figs. 14c, d, 15, 16

Holotype.—♂ (sl = 1.8 mm), sta D66, off east side of Fortune Island, Bahamas, 22°11′N, 74°17.40′W, 26 m, 30 Aug 1973, coll. J. C. Markham, USNM 306895.

Paratypes.—Caribbean Sea: 1 ♀ (sl = 2.3 mm), sta D61, off east side of Fortune Island, Bahamas, 22°36.10′N, 74°22.10′W, 17.5 m, 28 Aug 1973, coll. J. C. Markham, SMNH 5264.—1 ♂ (sl = 2.0 mm), 1 ♀ (sl = 1.7 mm), sta D68, off west end, Providence Isles, Turks and Caicos Islands, 21°50.50′N, 72°20.80′W, 23 m, 31 Aug 1973, coll. J. C. Markham, USNM 306896.—1 ♂ (sl = 1.4 mm), sta D71, off west end, Providence Isles, Turks and Caicos Islands, 21°50.50′N, 72°20.80′W, 23 m, 31 Aug 1973, coll. J. C. Markham, RMNH D48668.—1 ♂ (molting, no measurement possible), sta P-630, 15°59.20′N, 86°02′W, 35–37 m, 21 Mar 1968, USNM 306897.

Description.—Shield (Fig. 15a) slightly to considerably longer than broad; anterior margin between rostrum and lateral projections somewhat concave; anterolateral margins sloping; posterior margin rounded; dorsal surface glabrous. Rostrum triangular, drawn out into slender spine. Lateral projections with very prominent marginal or submarginal spine.

Ocular peduncles moderately long and slender, about 0.80 times as long as shield length, somewhat swollen basally and tapering to bases of very slightly dilated corneas. Ocular acicles each with 4 or 5 slender spines; separated basally by approximately basal width of 1 acicle.

Antennular peduncles reaching to distal margins of corneas or beyond by nearly 0.35 times length of ultimate segment. Ultimate segment with 1–3 short seat at dorsolateral distal angle. Penultimate segment glabrous or with 1 or 2 short setae. Basal segment with prominent spine on lateral face dorsally.

Antennal peduncles approximately equal to length of ocular peduncles (including corneas) or somewhat longer. Fifth and fourth segments with few scattered setae. Third segment with prominent spine on ventrodistal margin. Second segment with dorsolateral distal angle produced, terminating in simple or bifid spine. First segment often with minute spinule on later-

odistal margin dorsally; ventrodistal margin produced and with small spine laterally. Antennal acicles reaching to bases of corneas or slightly beyond. Antennal flagella with 1 or 2 very short setae on every article proximally, less regular distally.

Right cheliped (Figs. 14d, 15b) longer and appreciably stronger than left. Dactyl approximately 0.85 times length of palm; dorsomesial face proximally and dorsomesial margin depressed ventrally, dorsomesial margin with row of small tubercles or spines; entire dorsal surface covered, but not extremely densely with blunt or spinulose tubercles or small spines; ventral surface with faint transverse rows of very low protuberances; cutting edge with 1 large calcareous tooth in proximal half and row of small calcareous teeth distally; terminating in small corneous claw. Palm approximately as long as carpus; dorsomesial distal angle produced as large tubercle or spine, dorsomesial margin rounded and armed with 2 or 3 longitudinal rows of small spines, tubercles or granules, dorsal surfaces of palm and fixed finger tuberculate or spinulose, 1–3 more prominent and somewhat raised spines or spinulose tubercles on dorsolateral face of palm proximally; dorsolateral margin with row of small tubercles or spines not extending full length of fixed finger; lateral face of fixed finger also tuberculate; lateral face and ventral surface of palm very weakly tuberculate or granular. Carpus approximately equal to length of merus; dorsomesial margin with row of 5 or 6 prominent spines, dorsolateral margin with row of slightly smaller, more closely-spaced spines, dorsal surface with 2–4 additional large to moderately small spines; dorsodistal margin with prominent spine, mesio- and ventrodistal margins minutely spinulose or tuberculate; laterodistal margin with small spine dorsally, ventrolateral margin with spine distally. Merus with prominent spine on dorsodistal margin, dorsal surface with few setae; ventrolateral margin with row of slender acute spines; ventromesial margin with 1 or 2 small spines distally and tiny spinulose protuberances proximally. Ischium unarmed.

Left cheliped (Figs. 14c, 15c, d) with dactyl approximately 1.25 times length of palm; dorsomesial margin not delimited; dorsal, mesial and ventral surfaces with tufts of moderately long, stiff setae, dorsal surface also sometimes with few spinulose protuberances. Palm 0.50–0.75 times length of carpus; dorsal surface elevated in midline, not produced into prominent keel or crest, but armed with double row of small blunt or spinulose tubercles, extending onto fixed finger as single row, not extending to tip; dorsolateral and dorsomesial surfaces each with few small tubercles, dorsolateral margin with row of small spines or spinulose tubercles, dorsomesial margin not delimited; lateral and ventral surfaces varying from tuberculate to only faintly granular. Carpus equal to or slightly shorter than merus; dorsomesial and dorsolateral margins each with row of 4 or 5 spines; ventrolateral margin with 2 or 3 smaller spines distally. Merus subtriangular; dorsal margin unarmed; ventrolateral margin with row of acute spines; ventromesial margin with spine or spinule distally. Ischium unarmed.

Ambulatory legs (Fig. 16a–d) moderately long and stout; similar from left to right. Dactyls slightly longer than propodi; dorsal surfaces with sparse tufts of short setae; ventral margins each with row of 9–15, rather closely-set corneous spines, increasing in size distally. Propodi nearly twice length of carpi; dorsal surface occasionally with few low protuberances and corneous spinules; 1 or 2 corneous spines at ventrodistal angles, and often row of very small corneous spinules on ventral surface. Carpi each with dorsodistal spine and few scattered setae. Meri usually each with spine on ventral margin in distal half (second) or unarmed, but with few sparse setae.

Anterior lobe of sternite of third pereopods (Fig. 15e) with small spines anteriorly.

Telson (Fig. 15h) with very deep, broad median cleft; posterior lobes each with

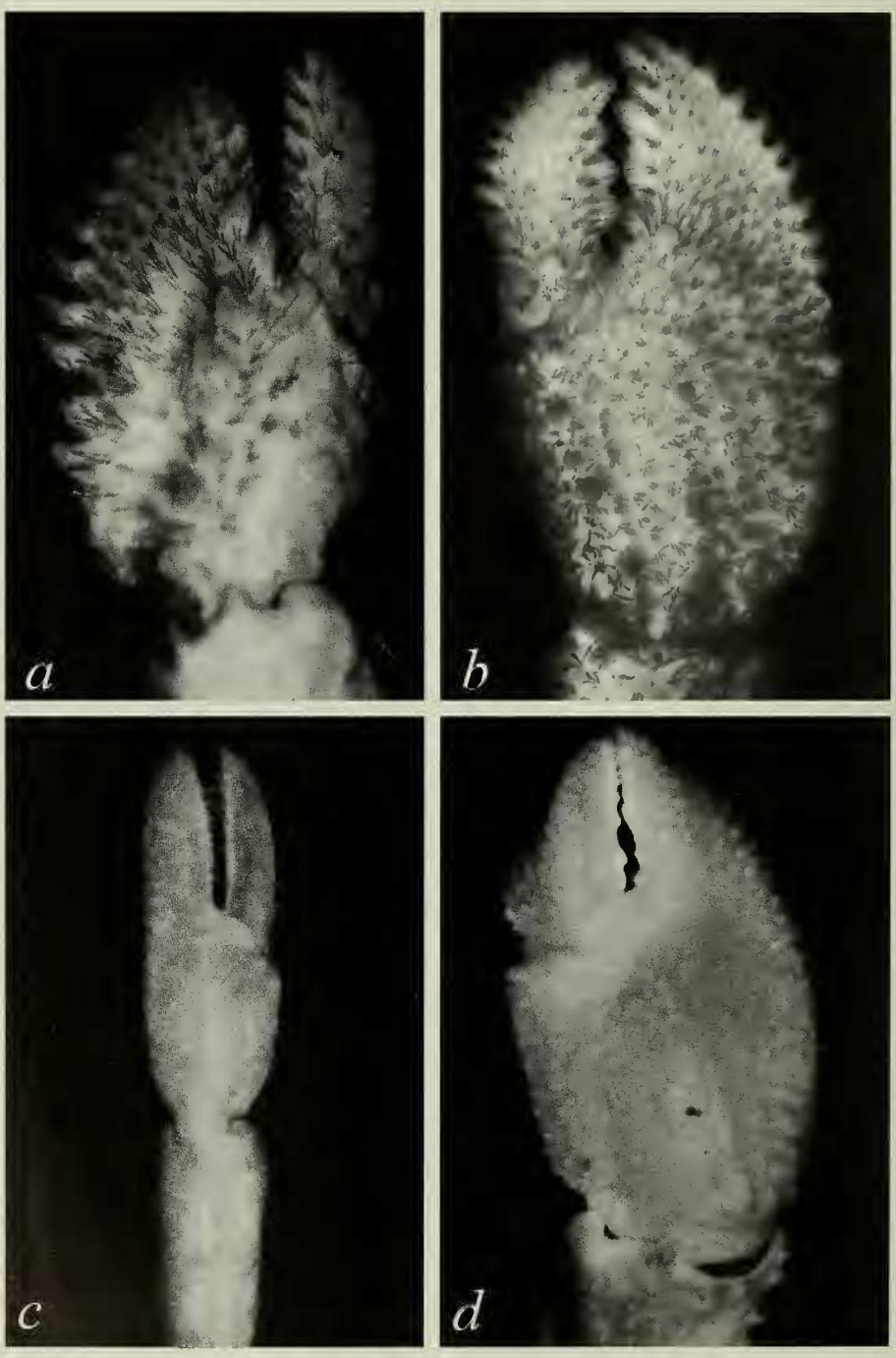

Fig. 14. Chelae of *Haigia diegensis* (Scanland & Hopkins, 1969) (a, b), and *Pylopaguridium markhami*, new species (c, d), dorsal. a, b, ♂ (sl 6.4 mm), Farnsworth Bank, LACM CR19703301; c, d, paratype ♀ (sl = 2.3 mm), sta D61, Bahamas, SNHM 5264. a, left (16.0×); b, right (9.9×); c, left (23.4×); d, right (23.3×).

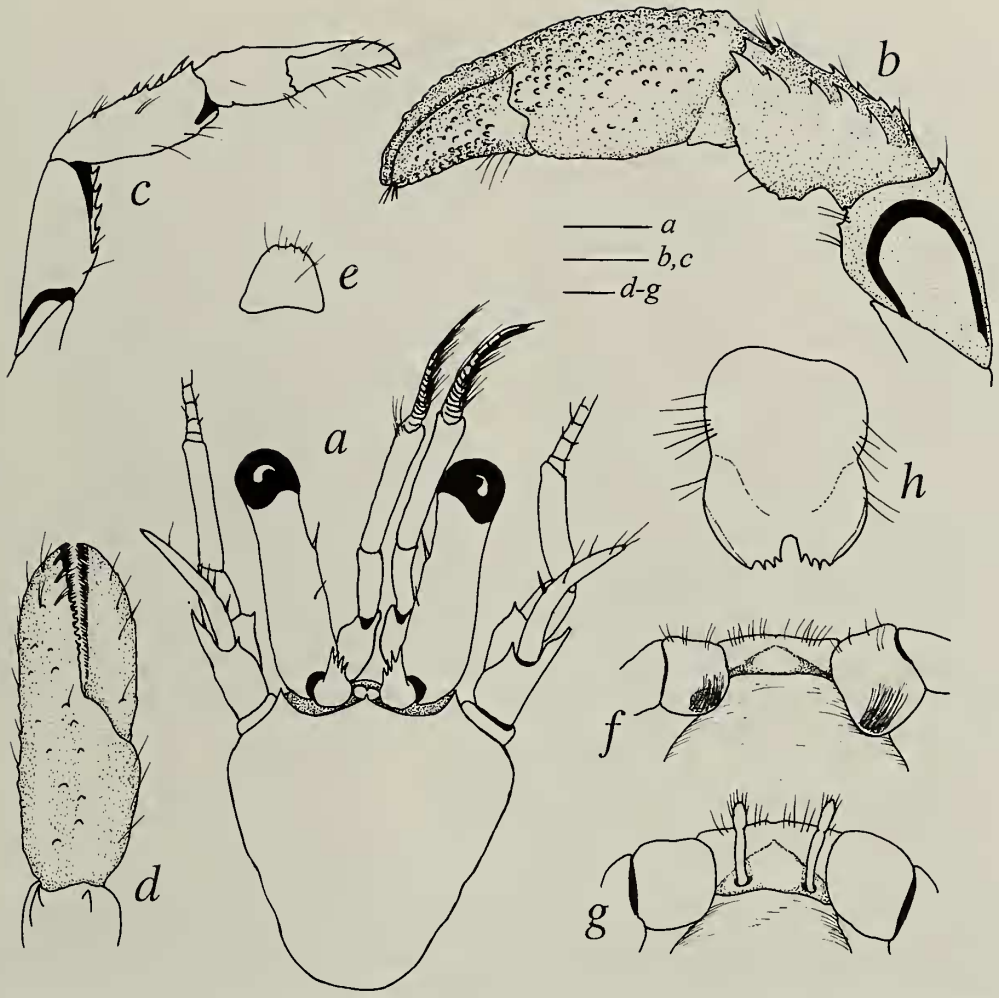

Fig. 15. *Pylopaguridium markhami,* new species. a, b, e, f, holotype ♂ (sl = 1.8 mm), sta D66, Bahamas, USNM 306895; c, d, g, paratypes, sta D68, Turks and Caicos Islands, USNM 306896: c, d, ♂ (sl = 2.0 mm); g, ♀ (sl = 1.7 mm). a, shield and cephalic appendages, dorsal; b, right cheliped, mesial; c, left cheliped, mesial; d, chela of same, dorsal; e, anterior lobe of sternite of third pereopods, ventral; f, coxae and sternite of fifth pereopods, and part of abdomen (lower), ventral; g, coxae and sternite of fifth pereopods, and part of abdomen (lower) showing first pleopods, ventral; telson, dorsal. Scales equal 0.5 mm (a–c), and 0.25 mm (d–g).

nearly straight terminal margins armed with 3 or 4 small spines.

Color.—Shield with faint yellowish tint and blue mottling. Ocular peduncles also with yellow tint and blue mottling. Antennular peduncles with basal segment faint yellow with blue mottling. Antennular peduncles with ultimate segment and flagella purple. Antennal peduncles with faint reddish-brown band on dorsal surface and reddish-brown patch proximally on ultimate segment; antennal acicle with prominent large reddish-brown patch in distal half and lighter, smaller patch proximally. Right cheliped with chela mottled reddish-brown, dactyl and distal part of fixed finger cream with patches of reddish-brown; carpus white distally, mottled reddish-brown and cream on remainder of carpus, merus and ischium. Left cheliped with chela light red-

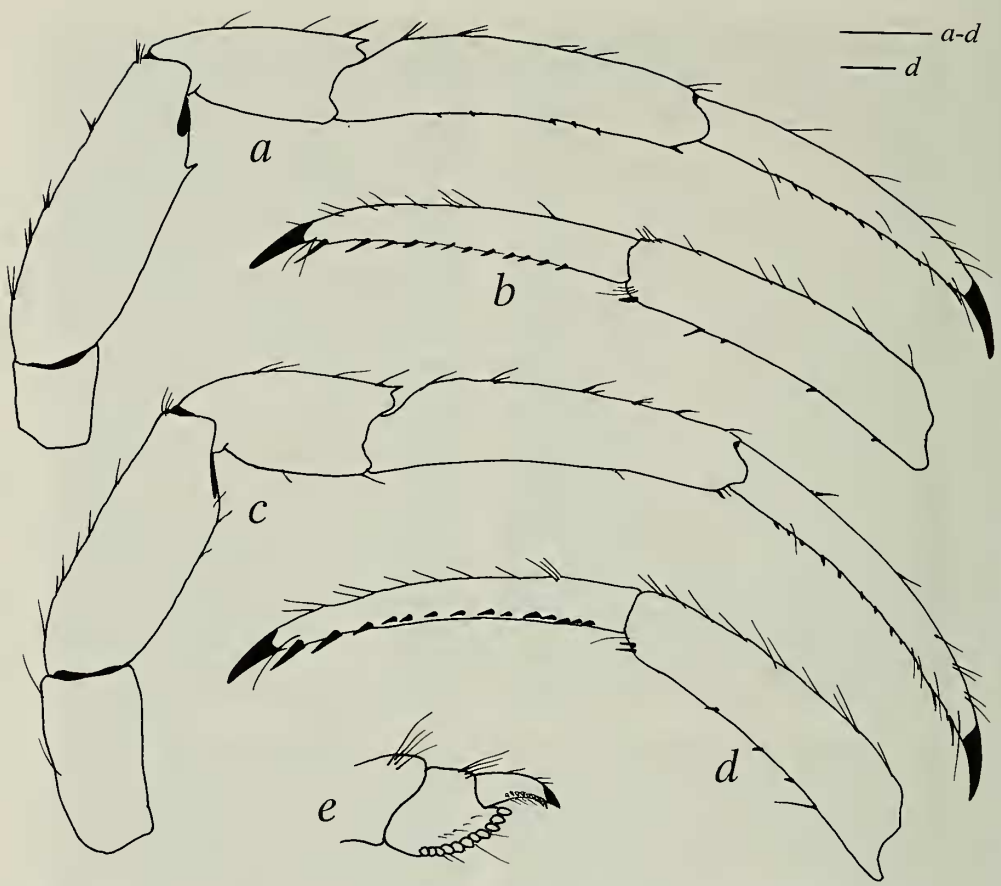

Fig. 16. *Pylopaguridium markhami,* new species. a–d holotype ♂ (sl = 1.8 mm), sta D66, Bahamas, USNM 306895; e, paratype ♂ (sl = 2.0 mm), sta D68, Turks and Caicos Islands, USNM 306896. a, right second pereopod, lateral; b, propodus and dactyl of same, mesial; c, right third pereopod, lateral; d, propodus and dactyl of same, mesial; e, propodus and dactyl of right fourth pereopod, lateral. Scales equal 0.5 m (a–d), and 0.2 mm (e).

dish-brown, spines darker; carpus and merus mottled reddish-brown and cream. Ambulatory legs basically white with reddish-brown short longitudinal patch or stripe on dorsal surface of dactyl proximally; propodi each with similar patch or striped in dorsal midline and similar, but fainter patch on lateral face medially; carpi each with single dorsal patch and 1 or 2 similar but lighter patches on lateral face; meri with small reddish brown patches dorsally and ventrally, median patches tending to form incomplete band on lateral face; ischia each with 1 or 2 dorsal patches or reddish-brown and 1 patch ventrally (color notes from specimen molt).

Etymology.—This species is named for Dr. John C. Markham (Arch Cape Marine Laboratory, Arch Cape, Oregon), its principal collector, as well as our colleague and friend.

Habitat.—Gastropods shells.

Distribution.—Caribbean Sea: Bahamas and Turks and Caicos Islands; off eastern Honduras; 17.5–36 m.

Remarks.—Despite the enlarged left fifth coxa in males of *Pylopaguridium markhami,* new species, it does not appear relat-

ed to *Paguridium minimum* (Chevreux & Bouvier, 1892) of the monotypic genus *Paguridium* Forest, 1961. In *P. minimum,* the left male gonopore is masked by a tuft of long stiff setae directed from left to right across the gonopore, and reaching beyond the midline of the sternite (Forest 1961:237, fig. 5), whereas in *Pylopaguridium markhami,* the gonopore is only partially concealed by a tuft of setae arising from the posterior margin of the gonopore and directed anteriorly (Fig. 15f). While three unpaired male pleopods are present in *P. markhami,* pleopods are lacking in *Paguridium minimum.* Additionally, females of *Pylopaguridium markhami* have paired first pleopods, whereas females of *Paguridium minimum* lack first pleopods. Among genera of the "*Pylopagurus-Tomopagurus*" group, only in species of the genus *Protoniopagurus* are male pleopods entirely lacking (Lemaitre & McLaughlin 1996).

Haigia McLaughlin, 1981

Haigia McLaughlin, 1981a:5.

Type species.—By monotypy, *Pylopagurus diegensis* Scanland & Hopkins, 1969.

Gender: feminine.

Diagnosis.—Eleven pairs of biserial gills. Ocular acicle triangular, with submarginal spine. Maxillule (Fig. 1d) with short internal endopodal lobe with 2 terminal bristles, external lobe elongate, not recurved. Maxilla (Fig. 1e) with proximal lobe of scaphognathite moderately narrow. First maxilliped (Fig. 1f) with slender exopod. Crista dentata of third maxilliped well developed, with 1 accessory tooth. Sternite of third maxillipeds with spine on either side of midline.

Right cheliped with chela subquadrate to subrectangular. Left cheliped with lateral margin of chela somewhat expanded, chela triangular in cross-section but not elevated into prominent keel or crest. Fourth pereopods with propodal rasp consisting of single row of corneous scales.

Sternite of third pereopods with subsemicircular to roundly subrectangular anterior lobe. Sternites 4 and 5 broad, typically without capsulate setae. Coxae of male fifth pereopods symmetrical, gonopores without vas deferens produced to form short sexual tube(s); without paired pleopods, with 3 unpaired unequally biramous left pleopods. Females with paired first pleopods incompletely 2-segmented and modified as gonopods, and with 4 unpaired biramous left pleopods, second through fourth with both rami well developed, fifth with endopod reduced.

Abdomen flexed or straight. Uropods asymmetrical. Telson with lateral indentations suggesting division into anterior and posterior portions; subequal posterior lobes separated by distinct median cleft; terminal margins slightly excavated, straight, with series of small spines.

Distribution.—Apparently restricted to the eastern Pacific from southern California to Baja California and the Gulf of California, Mexico.

Remarks.—Among the "*Pylopagurus-Tomopagurus*" group of genera, *Haigia* appears most similar to *Pylopaguridium,* new genus, in lacking an operculate right chela so common to species of most genera. However, the symmetry of the coxae of the male fifth pereopods immediately separates the species of these two monotypic genera.

Haigia diegensis (Scanland & Hopkins, 1969)

Figs. 14a, b, 17

Pylopagurus diegensis Scanland & Hopkins, 1969:257, fig. 1 (type locality: La Jolla Cove, La Jolla, San Diego County, California).—Haig et al., 1970:21.—Haig, 1977:13.—Wicksten, 1977:24.

Haigia diegensis: McLaughlin, 1981a:5.

Type material.—Holotype: ♂, La Jolla Cove, La Jolla, San Diego County, California, 5 m, 1964, LACM CR19622341 (not seen). Paratypes: 1 ♂ (sl = 3.5 mm), La Jolla Cove, La Jolla, San Diego County, California, 10 m, 1964, USNM 120425; 1

ovig ♀ (sl = 2.2 mm), Los Coronados Island, Baja California, Mexico, 20 m, 1964, USNM 120424.

Material examined.—Eastern Pacific: 1 ♂ (sl = 3.7 mm), off Anacapa Island, 17–18 m, 29 Oct 1962, USNM 111394.—1 ♂ (sl = 5.4 mm), Pelican Cove, Santa Cruz Island, 6–12 m, 12 Aug 1963, colls. Conboy, Scronce, MacGinities, USNM 111391.—6 ovig ♀ (sl = 4.2–5.2 mm), Los Angeles Harbor, 1–2 m, 19 Dec 1990, coll. J. Crain, PMcL.—1 ♂ (sl = 6.4 mm), 1 ♀ (sl = 3.7 mm), Farnsworth Bank, 20–23 m, 12 Dec 1970, LACM CR19703301.

Diagnosis.—Shield (Fig. 17a) longer than broad; rostrum roundly triangular, with terminal spinule; lateral projections broadly triangular, with strong marginal spine. Ocular peduncles slightly more than half shield length, swollen basally and tapering to bases of cornea; ocular acicles roundly triangular, with strong submarginal spine, separated basally by approximately 0.65 times basal width of 1 acicle. Antennular peduncles slightly overreaching distal margins of corneas. Antennal peduncles not quite reaching or slightly overreaching distal margins of corneas.

Right cheliped (Fig. 14b) with tufts of short stiff setae interspersed among marginal spines of subrectangular chela; dactyl moderately broad, dorsal surface with covering of low tubercles, dorsomesial margin with row of strong acute or blunt spines; palm and fixed finger covered with tufts of short setae and scattered tubercles, dorsomesial and dorsolateral margins each with row of strong blunt or subacute spines. Carpus with row of strong acute or subacute spines on dorsomesial margin, dorsal surface with numerous prominent spines, partially concealed by long setae.

Left cheliped (Fig. 14a) with dorsal surfaces of dactyl, fixed finger and palm all with numerous tufts of short, stiff setae; palm with row of strong acute or subacute spines in dorsal midline, extending onto fixed finger mesially, dorsolateral margin with row of strong spines, dorsomesial margin with few low spines or tubercles. Carpus subtriangular, with row of strong spines on dorsal margin, partially obscured by long setae.

Ambulatory legs (Fig. 17b, c) generally similar from left to right. Dactyls usually shorter than propodi, dorsal margins with tufts of moderately long to long setae, ventral margins each with 6 or 7 corneous spines. Propodi with tufts of setae on dorsal, mesial and lateral faces; ventrodistal margins of second each with pair of corneous spines, ventral margins of third each with row of corneous spines. Carpi each with spine at dorsodistal margin. Meri of second each with 1 acute spine near ventrolateral distal angle and 2 or 3 spines on ventrolateral margin distally, meri of third unarmed.

Telson (Fig. 17d) with posterior lobes usually separated by small median cleft, terminal margins with 3 or 4 strong and 2 to several smaller spines; lateral margins angular, with narrow corneous or weakly calcified marginal plate.

Color.—Carapace and ocular peduncles pale pink. Chelipeds and walking legs darker pink. Tubercles on chelae white. Approximate distal half of fingers white on both chelae. Dactyls of walking legs with dark corneous broad tips, and adjacent white ring. Proximal portions of dactyls each circumscribed with broad dark red band (based on Scanland & Hopkins 1969).

Habitat.—A variety of gastropod shells, and occasionally serpulid tubes.

Distribution.—Eastern Pacific, California coast from the Channel Islands to Coronado Islands; Baja, California and Guadeloupe Island, Mexico; 3–23 m.

Remarks.—When originally described in the genus *Pylopagurus* sensu lato, Scanland & Hopkins (1969) related their species to *Rhodochirus hirtimanus* (Faxon, 1893) (as *Pylopagurus*), as the two species were similar in having asymmetrical uropods, a single row of scales in the propodal rasp of the fourth pereopods, and armature of the chelae consisting of large tubercles.

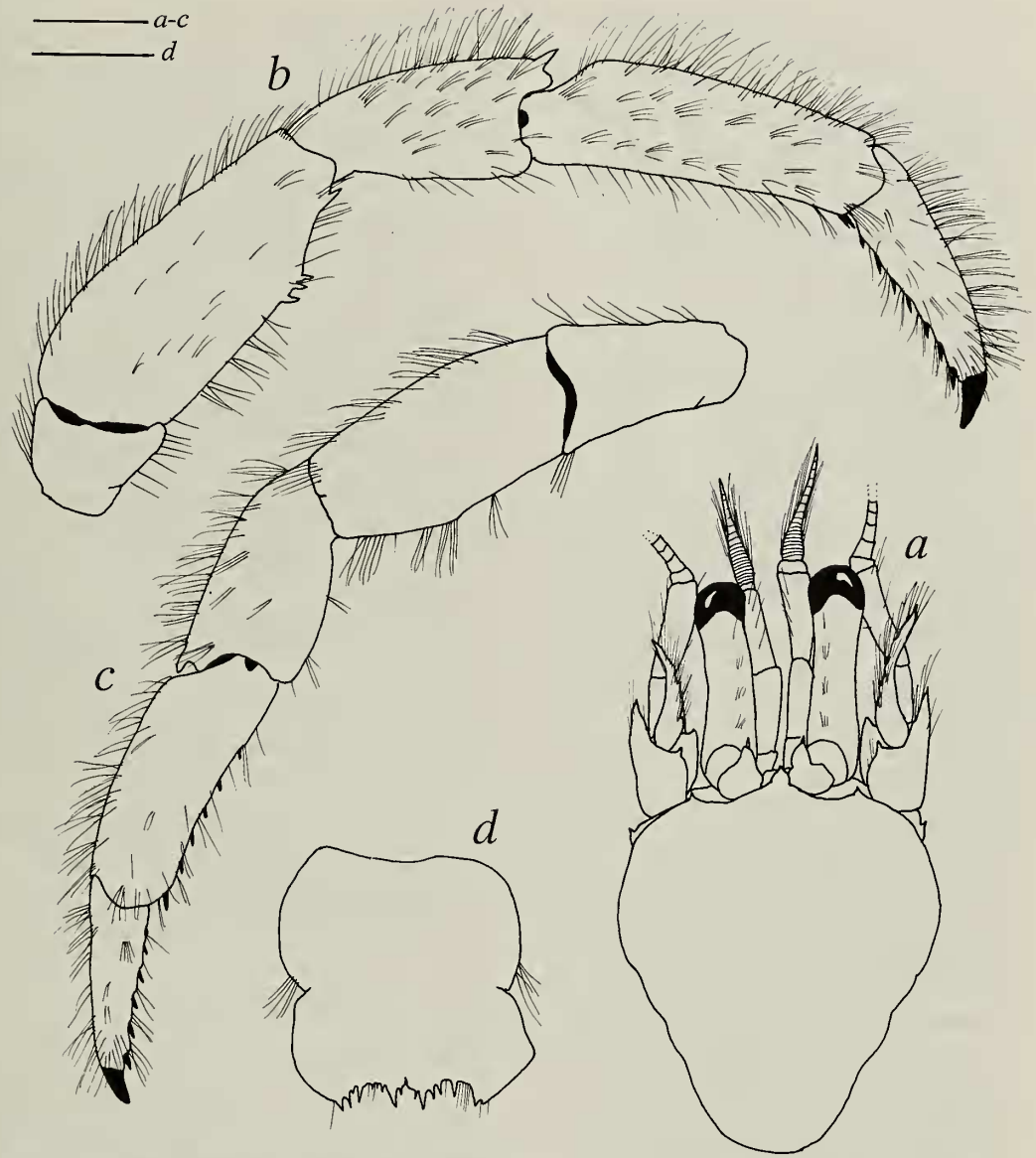

Fig. 17. *Haigia diegensis* (Scanland & Hopkins, 1969). ♂ (sl = 6.4 mm), Farnsworth Bank, LACM CR19703301. a, shield and cephalic appendages, dorsal; b, right second pereopod, lateral; c, right third pereopod, mesial; d, telson, dorsal. Scales equal 2 mm (a–c), and 1 mm (d).

Despite these similarities, McLaughlin (1981a) was of the opinion that the chela armature and telson structure of *P. hirtimanus* suggested a closer relationship to the Atlantic *Pylopagurus rosaceus* A. Milne-Edwards & Bouvier, 1893, and for these two species she proposed the genus *Rhodochirus*. For *Pylopagurus diegensis* she proposed the ge nus *Haigia*. As is indicated in the generic remarks, as well as in discussion of the genus described below, *Haigia* and *H. diegensis* show more general similarities to *Pylopaguridium*, new genus, and its type species, than either do to most other genera of the "*Pylopagurus-Tomopagurus*" group.

Key to genera of the "*Pylopagurus-Tomopagurus*" group

1. Propodal rasp of fourth pereopod with single row of corneous scales 2
– Propodal rasp of fourth pereopod with multiple rows of corneous scales ... 10
2. Telson with median cleft, terminal margins of posterior lobes each with 1 or more spines 3
– Telson lacking median cleft, terminal margin unarmed .... *Enallopagurus* McLaughlin, 1981a
3. Ocular acicles simple. Coxae of male fifth pereopods symmetrical 4
– Ocular acicles multispinose. Coxae of male fifth pereopods asymmetrical ....*Pylopaguridium,* new genus
4. Chela of right cheliped subovate to subcircular, margins unarmed, weakly tuberculate or minutely crenulate and/or serrate, but never armed with prominent blunt or acute spines or tubercles 5
– Chela of right cheliped variable, margins armed with prominent blunt or acute spines or tubercles 6
5. Fourth pereopods with large, very prominent preungual process at base of claw ... *Phimochirus* McLaughlin, 1981a
– Fourth pereopod without large, very prominent preungual process at base of claw ..... *Pylopagurus*
6. Spines of right chela with basal rosettes ..... *Rhodochirus* McLaughlin, 1981a
– Spines of right chela without basal rosettes 7
7. Dactyl and fixed finger of left chela excavated ventrally, presenting "spoon-shaped" appearance ..... *Tomopagurus*
– Dactyl and fixed finger of left chela not excavated ventrally and not presenting "spoon-shaped" appearance 8
8. Left cheliped with rotation of propodal-carpal articulation 45°–90° from horizontal plane ....*Lophopagurus* (*Australeremus*) ..... McLaughlin, 1981a
– Left cheliped with rotation of propodal-carpal articulation much less than 45° from horizontal plane 9
9. Left chela with midline elevated into prominent keel or crest ....*Lophopagurus* (*Lophopagurus*) ..... McLaughlin, 1981a
– Left chela with midline sometimes elevated, but not into prominent keel or crest ..... *Haigia*
10. Telson with median cleft separating posterior portion into symmetrical or asymmetrical lobes 11
– Telson lacking median cleft, no separation of posterior portion into symmetrical or asymmetrical lobes 13
11. Uropods symmetrical or nearly so, with protopods produced posteriorly ....*Agaricochirus* McLaughlin, 1981a
– Uropods markedly asymmetrical, protopods not produced posteriorly 12
12. Left chela triangular in cross-section, dactyl and fixed finger not dorsoventrally flattened ....*Anisopagurus* McLaughlin, 1981a
– Left chela not triangular in cross-section, dactyl and fixed finger dorsoventrally flattened .... *Manucomplanus* McLaughlin, 1981a
13. Chelae of chelipeds subequal; males without unpaired left pleopods .... *Protoniopagurus*
– Chelae of chelipeds unequal; males with unpaired left pleopods .... *Enallopaguropsis* McLaughlin, 1981a

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